Final Draft Technical Report on Infrastructure in the District of Columbia

APRIL 2006

THE Louis Berger Group, INC.

DISTRICT DEPARTMENT OF TRANSPORTATION

DC OFFICE OF PLANNING

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1.0 INTRODUCTION

The District of Columbia's Comprehensive Plan (Comp Plan) provides policy and planning guidance on the physical development and redevelopment of the city. In the District of Columbia, the Comp Plan is a legally required document, which includes District Elements — prepared by the DC Office of Planning — and Federal Elements — prepared by the National Capital Planning Commission. This technical report supports the Comp Plan (District Elements) with relevant information related to the District's infrastructure systems, including potable water, wastewater, stormwater, energy/telecommunications, and solid waste.

Like many older historic cities, the District suffers from aging infrastructure, some portions of which are over a century old. The central challenge faced by the District is not that of capacity but one of meeting maintenance and replacement needs. In fact, the number of households in the city today is not substantially different than it was in 1950, though there are 230,000 fewer residents. Consequently, the infrastructure is generally in place to support additional growth, with some exceptions at specific locations where development did not previously exist. The conveyance systems and facilities, however, are suffering from structural deterioration and in need of significant rehabilitation, modernization, and expansion as aging components approach the end of useful life. District agencies strive to balance the need for immediate system upgrades with long term planning and funding strategies to both accommodate the increased demands and prioritize improvements in the areas where the need is most significant, including in those areas that have not been previously developed for more intense uses.

1.1 THE EXISTING (1984) COMPREHENSIVE PLAN

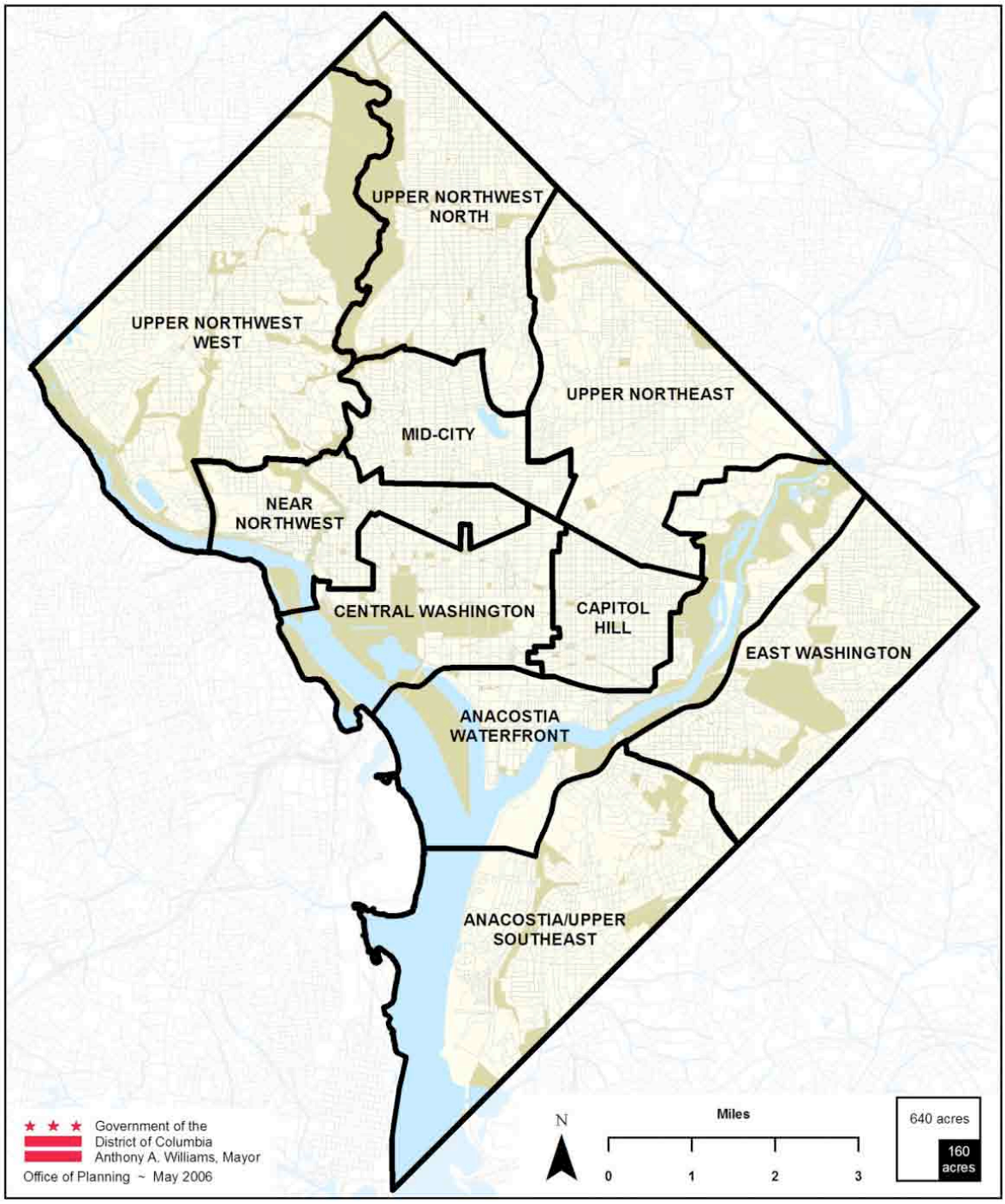
The previous Comprehensive Plan and subsequent revisions provided few policies specifically related to water, sewer, solid waste, recycling, energy, or telecommunication in the District. The majority of policies and action statements pertained to public facilities. The 11 policies in the previous versions of the Comprehensive Plan that are categorized as infrastructure recommend maintaining the adequacy of facilities, improving the distribution of services, and focusing on investment and funding for capital improvements.

Unlike other elements in the previous versions of the plan, there have been few plan actions relating to infrastructure. Therefore, it is more difficult to gauge the District's progress in addressing infrastructure needs since the 1984 Comprehensive Plan was prepared, than to gauge progress in other topics such as transportation and housing. The District now has the opportunity to provide sound policies and goals that will guide the long-range interest of District residents through the anticipated land use changes. This Comprehensive Plan Revision also provides the opportunity for the District to promote innovative and alternative methods that have been successfully implemented in similar cities.

1.2 CURRENT COMPREHENSIVE PLAN REVISION – PLANNING AREAS

The current effort to revise the Comp Plan has divided the District into ten areas for purposes of planning and discussion, as shown in Figure 1.1. The remainder of this report will refer to these areas when discussing infrastructure relevant to a specific location in the District.

Figure 1.1: Planning Areas in DC Comprehensive Plan



2.0 SUMMARY OF METHODOLOGY AND LIMITATIONS

2.1 METHODOLOGY

Preparation of this technical report for Infrastructure in the District involved four major research tasks: preparation of a baseline report, analysis of growth from projected land use changes, the assessment of the existing infrastructure to meet projected demands, and development of recommendations to help meet projected growth and associated demand.

First, the Infrastructure Team assembled existing District agency documents, publications, and GIS data and interviewed systems engineers from Department of Public Works (DPW), the District of Columbia Water and Sewer Authority (WASA) and Potomac Electric Power Company (Pepco). This was used to establish a baseline for the existing infrastructure serving the District of Columbia, including maintenance, operations, and planned improvements.

Second, the team analyzed land use changes projected in the DC Comprehensive Plan that could impact infrastructure. By overlaying the transportation analysis zone (TAZ) projections numbers for household and employment from 2005-2025 with the Area Elements (planning areas), the team could determine the approximate geographic locations where projected growth in population would add to current demand for potable water, wastewater conveyance, and power.

Third, the ability of the existing infrastructure and current problems of condition or capacity to support the projected land use changes was assessed. Existing assessments within the utility service providers were consulted or new assessments coordinated with utility experts. By cross-referencing areas of growth and change with water pressure zones (service areas) and areas of substation utilization, the results determined which geographic areas would require the most extensive expansion, upgrades, or modernizations of infrastructure.

- To evaluate potable water needs, potable water demand was calculated based on current trends in water usage and the projected population growth, then was compared to the most recent utility projections for water demand. The comparison found that the utility forecasts remained valid.
- To evaluate power, requirements were compared to planned infrastructure improvements, in consultation with Pepco, to determine additional infrastructure improvements necessary to address shortfalls.

Fourth, solid waste management and wastewater conveyance and treatment was assessed by reviewing the most current plans and statistics for the District and by discussing issues with the District's solid waste and wastewater managers.

Finally, the assessment incorporated stakeholder feedback (elicited from interviews with DPW, WASA and PEPCO) and best management practices in similar cities to identify recommendations that would enhance infrastructure services, operations, and procedures to support successfully the projected growth in employment and population in the District over the next twenty years.

2.2 LIMITATIONS

WASA is currently conducting a multi-year assessment of the wastewater system and Sewer Master Plan, due for completion in 2007. Therefore, a full assessment of the wastewater system's condition in this report is limited. This report aims to provide an understanding of the major,

known deficiencies and issues that could limit reuse/redevelopment within the area elements. The results of that multi-year assessment, when available, will provide much greater detail as to the condition of the system.

It is difficult, in an engineering sense, to analyze future capital improvement needs or adequacy of sewers or water without precise locations and requirements. The assessment of this technical report is limited to general trends in growth based on projected population data. It would be expected that for the modest growth that is forecasted in the Comprehensive Plan, needed infrastructure would be site-specific. In order to determine specific systems improvements based on associated growth, detailed information on projected densities on a block-by-block basis would be required, which is currently not available.

This report does not include detailed analysis of existing utility and energy infrastructure on federal property in the District, nor their current rate structure or future requirements. This topic is a subject for future study and analysis.

3.0 EXISTING CONDITIONS

3.1 WATER

The waterworks system serving Washington, D.C., consists of two primary components: (1) supply and treatment, and (2) distribution. The supply and treatment system includes the raw water sources, the large capacity pipelines that convey raw water to the water treatment plants, and the water treatment plants.

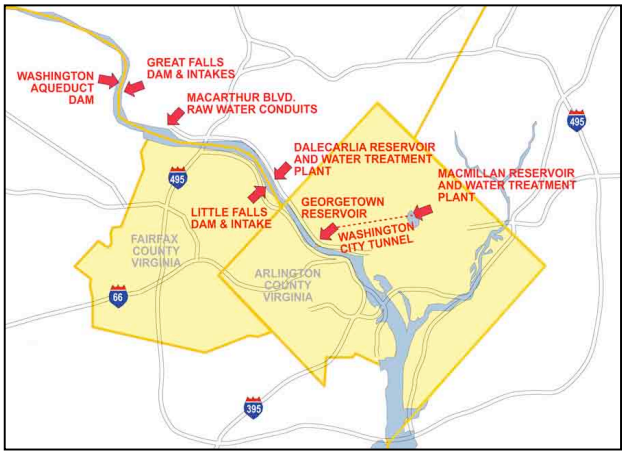
3.1.1 POTABLE WATER SUPPLY AND TREATMENT – THE WASHINGTON AQUEDUCT

Overview

The Washington Aqueduct Division of the U.S. Army Corps of Engineers (USACE) is responsible for source water supply and treatment (Figure 3.1). The USACE withdraws water from the Potomac River and supplies water to over one million users in the District, Arlington County and Falls Church, Virginia and portions of the Federal Government. The majority of this supply is sold to the District.

Congress commissioned the Washington Aqueduct in 1852 as an acknowledgement that the nation's capital required more than the wells and springs that were then the sources of water. The Army Corps of Engineers built the aqueduct from 1853 to 1859 under the supervision of Montgomery Meigs. It has been in continuous operation ever since. The system is composed of the Great Falls & Little Falls intakes on the Potomac River, the Dalecarlia and McMillan Reservoirs, the Georgetown Conduit and Reservoir, the Washington City Tunnel, and the East Shaft Pump Station.

Figure 3.1: Washington Aqueduct System



3.1.2 WATER DEMANDS

Historical Water Use

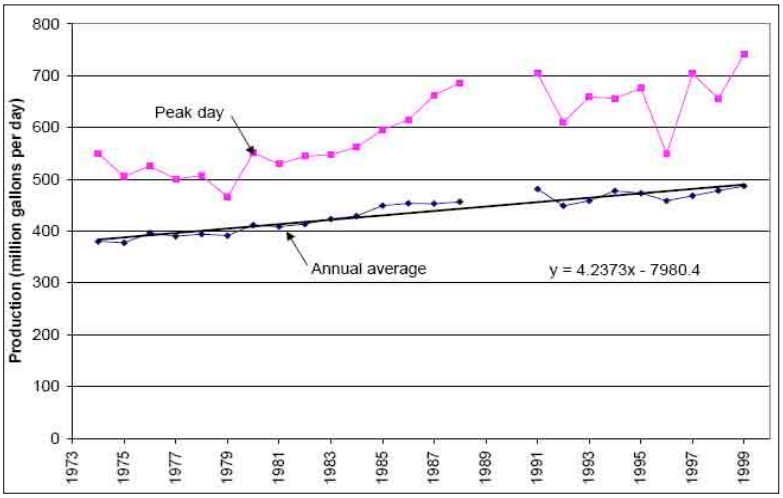
The average flow in the Potomac River is more than adequate to meet the present and anticipated future requirements[i] of the Washington metropolitan area. The 1978 Low Flow Allocation Agreement (LFAA) was signed by the Federal Government, Maryland, Virginia, the District of Columbia, the Washington Suburban Sanitary Commission (WSSC), and the Fairfax County Water Authority (FCWA). They recognized the need to maintain a minimum flow in the Potomac River that would be sufficient to sustain aquatic resources. The agreement established a set of stages for low river flow that would prompt action by the signatories to monitor and eventually restrict water withdrawals. It also established a formula for allocating Potomac River water during times of shortage. The LFAA's low-flow stages have never been triggered, and a subsequent agreement minimized the possibility that they would ever be triggered.

In 1982, the major water utilities and the Interstate Commission on the Potomac River Basin (ICPRB) signed the Water Supply Coordination Agreement (WSCA). It required major water suppliers to coordinate their operations during droughts in order to minimize the possibility of having to implement the restrictive stages of the LFAA. The actions of the water supply agencies are coordinated through a Drought-Related Operations Manual administered by ICPRB's Section for Cooperative Water Supply Operations on the Potomac (CO-OP). The major suppliers agreed to have CO-OP conduct a 20-year supply-demand study every five years. They further agreed to share the costs for supply augmentation facilities and subsequently constructed the Jennings Randolph and Little Seneca Reservoirs that serve to augment the region's water supply during droughts.

The ICPRB Year 2005 assessment concluded that even with a high growth scenario, the water supply system developed 25 years ago is adequate to meet 2025 demand under a repeat of the worst meteorological and stream flow conditions in the historical record. Furthermore, it concluded that the system is able to meet estimated future water supply demand in 2045 given a repeat of the same drought conditions[ii].

Figure 3.2 shows water demand for the three regional suppliers: the FCWA, WSSC, and Washington Aqueduct. The historic maximum day production from the Washington Aqueduct was 284 mgd, which occurred in 1974. After the 1974 peak, water demand in the District has decreased and is now relatively stable. Average daily production from the Washington Aqueduct Division is currently approximately 185 mgd with a maximum day use at approximately 245 mgd.

Figure 3.2: Combined Annual Average and Peak Day Water Demand for FCWA, WSSC, and the Washington Aqueduct



Source: Year 2000 Twenty-Year Demand Forecast and Resource Availability Analysis for the Washington Metropolitan Area (ICPRB, 2000)

Future Water Requirements

WASA utilizes historical pumpage data for each service area and demographic projections of household and employment (based on the Round 5.0 Cooperative Forecasts developed by the Metropolitan Washington Council of Governments and other historical data) to determine the projected water demands for each of service areas of DC.

Historical pumpage data was used to establish base-year demands and unit demand factors. The unit demand factors were then applied by WASA to the five-year incremental demographic forecasts to calculate corresponding water demands through the end of the planning period in 2025. The projected water requirements for the overall system and for each service area are summarized in Table 3.1.

Section 4.0 of this report provides a comparison of the WASA water demand projections shown below to projected water demand calculated from the Comprehensive Plan's assumptions for population growth and current trends in water consumption, rather than the historical pumping rates. The comparison results in a conclusion that the WASA projected water demand remains valid.

Table 3.1: Current and Projected Water Demands (mgd) for Washington Potable Water Service Areas

Service Area	Year 2000			Year 2020		
	Annual Average Day	Maximum Day	Peak Hour	Annual Average Day	Maximum Day	Peak Hour
First High	35.0	51.4	101.8	40.0	58.8	116.4
Second High	22.6	29.8	43.2	25.6	33.8	48.9
Third High	25.4	31.2	54.9	27.6	33.9	59.6
Fourth High	7.0	11.4	15.4	7.6	12.4	16.7
Low	26.5	36.3	70.0	32.7	44.8	86.3
Anacostia First High	14.1	20.4	40.6	15.9	23.7	45.8
Anacostia Second High	6.2	9.1	19.8	7.1	10.4	22.6
Total	136.8	189.6	345.7	156.5	217.8	396.3

Source: MWCOG Round 5.0 Cooperative Forecasts of Population, Households, and Employment and other historical data, methodology presented in Appendix B of the 2002 Water Facilities Plan

Water Treatment Plant Capacity

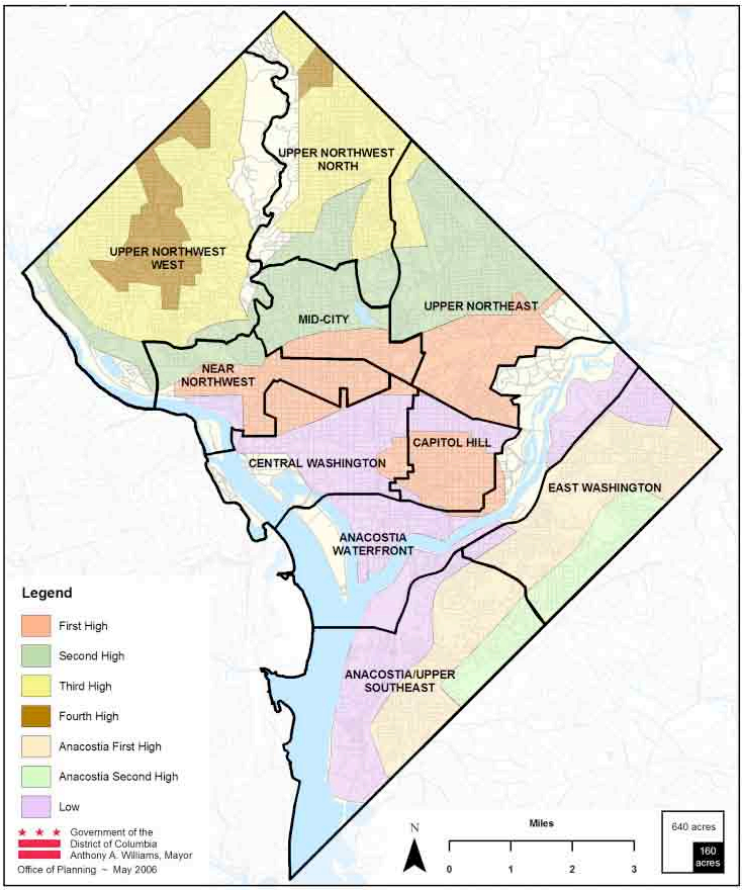
The USACE treats water at the Dalecarlia and McMillan water treatment plants (WTPs), which are both components of the Washington Aqueduct. Dalecarlia was constructed in 1928 and updated in 1950 and 1964. McMillan was constructed in 1905, but the slow sand filter plant was replaced with a rapid sand filtration plant in 1985 at the same location. There are two intake points, the Great Falls Intake and the Little Falls Intake. The Great Falls Intake feeds from the Potomac to the Dalecarlia Reservoir forebay, using gravity to move the water. Water may also be pumped from the Little Falls Intake up to the Dalecarlia Reservoir. The Dalecarlia Reservoir acts as a pre-sedimentation basin for water drawn into the Dalecarlia WTP and for water diverted to the McMillan WTP via Georgetown Reservoir. The Dalecarlia facility has a design capacity of 164 million gallons per day (mgd) and maximum capacity of 264 mgd. The McMillan facility has a design capacity of 120 mgd and a maximum capacity of 180 mgd. The design capacities of the Dalecarlia and McMillan WTPs were based on population growth and water use projections greater than have been realized. Their treatment capacity together exceeds the day-to-day water demand. Both plants serve the District, while only Dalecarlia serves Arlington and Falls Church.

3.1.3 WATER TRANSMISSION & DISTRIBUTION – WASA

Overview

The water distribution system, which consists of pumping stations, storage tanks and reservoirs, and pipelines, delivers treated (finished) water to customers. While the USACE is responsible for a portion of finished water distribution, WASA is responsible for finished water distribution to the District of Columbia and certain Department of Defense facilities.

Figure 3.3: Water System Service Areas



System Service Areas

A 410-foot difference in ground elevation from the low point to the high point in the District requires that the water system be divided into seven service areas (Figure 3.3).

WASA has plans for a new pressure zone east of the Anacostia River that will alleviate low-pressure problems in that area. Table 3.2 provides a description of each of the water system areas and lists the major elements of storage and pumping facilities contained in each.

Table 3.2: Description of Potable Water Service Areas

Service Area	Description	Ground Elevation (ft)	Pumping Stations	Treated Water Storage	Water Storage Elevation
First High	The First High Service Area generally serves the area west of the Anacostia River	70'-140'	Washington Aqueduct's Dalecarlia Pumping Station and WASA's Bryant Street Pumping Station	Foxhall Reservoir and Soldier's Home Reservoir	Foxhall: 25 mg at overflow elevation 250'; Soldier's Home: 15 mg at overflow elevation 250'
Second High	The Second High Service Area generally includes the area west of the Anacostia River between Rock Creek Park and Eastern Avenue	140'-210'	Washington Aqueduct's Dalecarlia Pumping Station and WASA's Bryant Street Pumping Station	Van Ness Reservoir	14.6 mg at overflow elevation 335'
Third High	The Third High Service Area includes the areas west of the Anacostia River separated by Rock Creek Park and bounded by Eastern and Western Avenues	210'-350'	Washington Aqueduct's Dalecarlia Pumping Station and WASA's Bryant Street Pumping Station	Fort Reno Reservoir No.1, Fort Reno Reservoir No.2	No. 1: 5.4 mg at overflow elevation 424'; No. 2: 20 mg at overflow elevation 424'
Fourth High	The Fourth High Service Area generally includes the area west of the Anacostia River separated by Rock Creek Park and bounded by the Eastern and Western Avenues	above 350'	WASA's Fort Reno Pumping Station (western portion) and the 16th & Alaska Pumping Station (eastern portion)	Fort Reno Elevated Tank No.2	0.16 mg at overflow elevation 485'
Low	The Low Service Area includes the area around the federal buildings, along the Anacostia River	0'-70'	Washington Aqueduct's Dalecarlia Pumping Station and WASA's Bryant Street Pumping Station	Brentwood Reservoir	25 mg at overflow elevation 172'
Anacostia First High	The Anacostia First High Service Area generally includes the area southeast of the Anacostia River separated by Rock Creek Park and bounded by the Eastern and Western Avenues	70'-170'	WASA's Anacostia Pumping Station	Fort Stanton Reservoir No.1 and Fort Stanton Reservoir No.2	Good Hope: 3 mg at overflow elevation 258'; Ft. Stanton: 10 mg at overflow elevation 258'
Anacostia Second High	The Anacostia Second High Service Area includes the area located southeast of the Anacostia River along Southern Avenue	above 170'	WASA's Anacostia Pumping Station	Good Hope Road Elevated Tank and Boulevard Elevated Tank	Good Hope: 0.5 mg at overflow elevation 382'; Boulevard: 2 mg at overflow elevation 382'

Water Storage and Pumping Facilities

WASA and the Washington Aqueduct Division share water storage and pumping responsibilities. WASA operates four treated water pumping stations (Bryant Street, Fort Reno, 16th & Alaska, and Anacostia), and eight reservoirs and elevated storage tanks. The Washington Aqueduct Division operates the Dalecarlia Pumping Station and three reservoirs (Foxhall, Van Ness, and Fort Reno). Recently, the elevated storage facilities were overhauled to ensure adequate water pressure for both fire protection and in-home use. (WASA, 2003 Drinking Water Quality Report)

Water Transmission and Distribution System

WASA's water transmission and distribution system includes almost 1,300 miles of pipes ranging in size from 4 to 78 inches in diameter. Water transmission and distribution pipes connect buildings and residences to water mains. WASA's water mains are comprised of roughly 87% cast iron pipe, 8% ductile iron, 2.5% steel pipe, and 2.5% reinforced and pre-stressed concrete cylinder pipe. The water mains are free of lead pipes. The lead pipes only occur in laterals for individual service to locations from the water mains.

The distribution system also includes other elements necessary for proper system operation, inspection, and repair. These include main line valves at regular intervals to allow flow control, air release valves to prevent air entrapment, blow-off valves for draining the pipeline, and check valves to permit flow in one direction only. There are also normally closed division valves to allow transfer of water during emergency conditions from service areas with higher ground elevations to service areas with lower ground elevations. The system includes over 36,000 valves and approximately 9,000 hydrants.

Approximately 1,060 miles of water mains in the WASA water system are 12-inch diameter and smaller. These small diameter water mains may not be considered critical from a supply and transmission standpoint, but they account for over 80% of the pipes in the system. In addition, over 50% of the water mains in the system are over 100 years old. Older unlined cast iron small diameter water mains are subject to tuberculation, the progressive development of interior deposition due to chemical and microbial action, and have historically more breaks. WASA has developed a $1.6 Billion dollar improvement plan to update the infrastructure over the next 10 years, including replacing and repairing water mains. (WASA, DWQR 2003)

Water Quality/Treatment Adequacy

Over the past few years, levels of lead in the drinking water in the WASA system exceeded the EPA action level of 15 parts per billion. Excluding the high lead levels, drinking water has met quality standards set by the federal government for public health protection. Water quality is affected by all three of the major components of a water supply system: raw water supply, treatment, and distribution. The quality of the water supplied by the Washington Aqueduct Division to WASA meets or exceeds all standards currently in effect under federal regulations, including physical, chemical, radiological, and bacteriological. These regulations are identified in the Safe Drinking Water Act (SDWA) and its amendments.

It should be noted that raw water supply, treatment and distribution systems do not contribute to increased lead levels in the WASA system. The presence of lead in tap water indicates that lead is being leached out or is dissolving from the service pipes connecting the water main in the

street to the residence or from solder or fixtures in a home's internal plumbing. As a result, orthophosphate is being added by the Washington Aqueduct in the treatment process to inhibit corrosion of lead and reduce lead levels. In addition, WASA has an aggressive lead service replacement program.

3.2 WASTEWATER

Principal components of the wastewater system are shown in Figure 3.4.

3.2.1 WASTEWATER COLLECTION

WASA collects and treats wastewater from people in Washington, DC, portions of Montgomery and Prince George's counties in Maryland, and portions of Fairfax and Loudoun counties in Virginia. The conveyance infrastructure consists of 1,800 miles of sanitary and combined sewers, 125,000 sewer laterals serving individual buildings, 22 flow-metering stations, and nine wastewater pumping stations. Separate sanitary and storm sewers serve approximately two-thirds of the District of Columbia. In older portions of the system, such as the District's downtown area, combined sanitary and storm sewer systems are prevalent. The sewers range from 8-inch pipelines to 27-foot arches. Historically, the sewers have generally been constructed of vitrified clay, brick, and concrete. Current sewer construction materials typically consist of PVC, ductile iron, and concrete. Force mains are generally constructed of iron, steel or concrete.

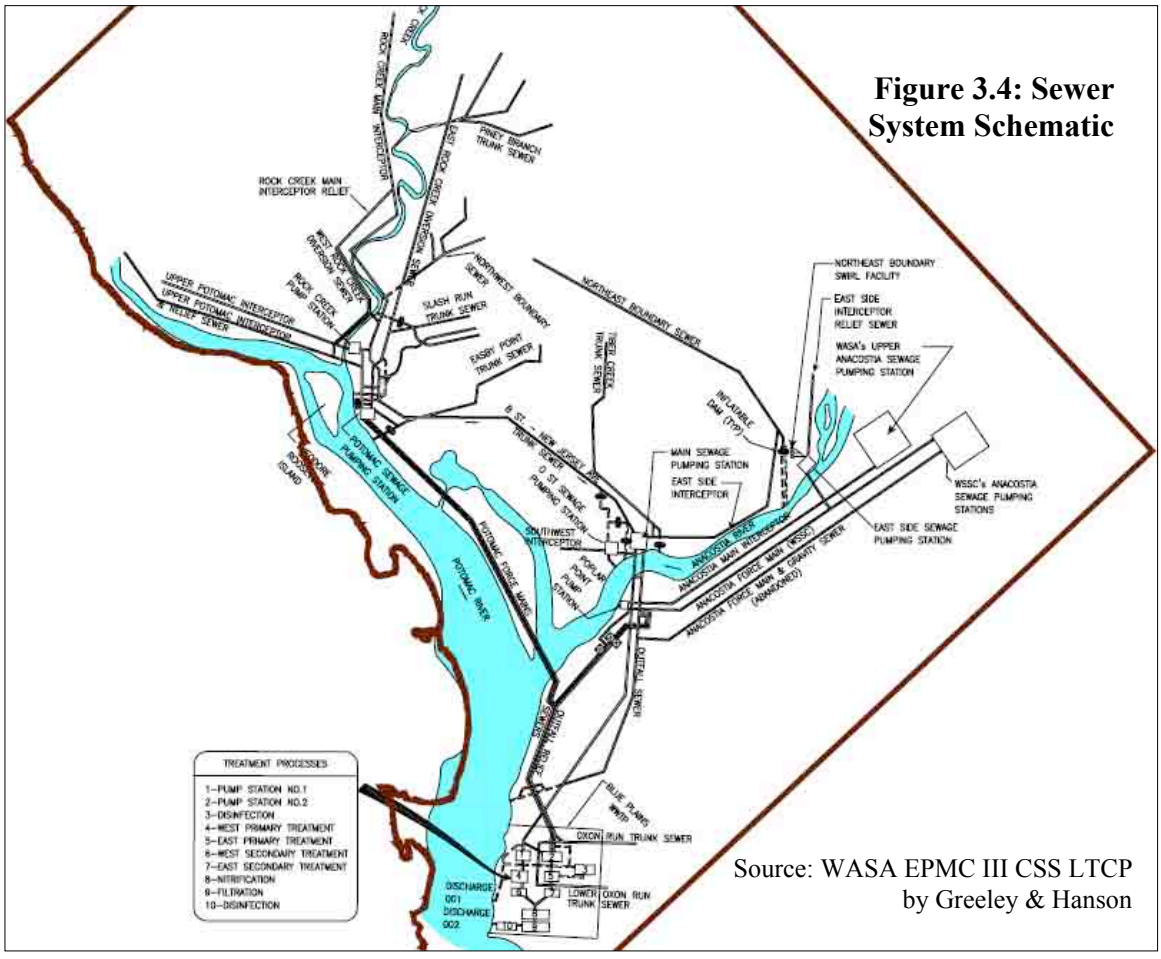


Figure 3.4: Sewer System Schematic

Source: WASA EPMC III CSS LTCP by Greeley & Hanson

Treatment & Disposal Overview

WASA treats collected wastewater and peak stormwater flows from over 2 million people at the Blue Plains Wastewater Treatment Plant. This includes the entire population of DC as well as over 1.6 million residents of Maryland and Virginia. The Blue Plains Wastewater Treatment Plant is the largest advanced wastewater treatment plant in the world, covering 150 acres with a rated annual average day capacity of 370 mgd and a peak wet weather capacity of 1.076 billion gallons per day. The Blue Plains Wastewater Facility treats 320 million gallons on a typical day. In addition to primary and secondary treatment, it provides nutrient removal, filtration, and disinfection. It is required by its National Pollutant Discharge Elimination System (NPDES) permit to have peak full-treatment capacity of 740 mgd for four hours (e.g. during storm events), which is then reduced to 511 mgd after four hours to protect the biological process. Flows that exceed the treatment capacity of the plant (up to a total flow of 1,076 mgd) receive excess flow treatment, consisting of screening, grit removal, primary treatment, and disinfection before discharge to the Potomac River.

3.2.2 COMBINED SEWERS

Overview

The District's sewer system is comprised of both combined sewers and separate sanitary sewers. While no new combined sewers have been built in the District in roughly the last 100 years, approximately one-third of the city is served by combined sewers. This means that both wastewater and stormwater are collected and conveyed within the same system. The majority of the combined sewers are located in Central Washington, but they also extend up into the Upper Northeast.

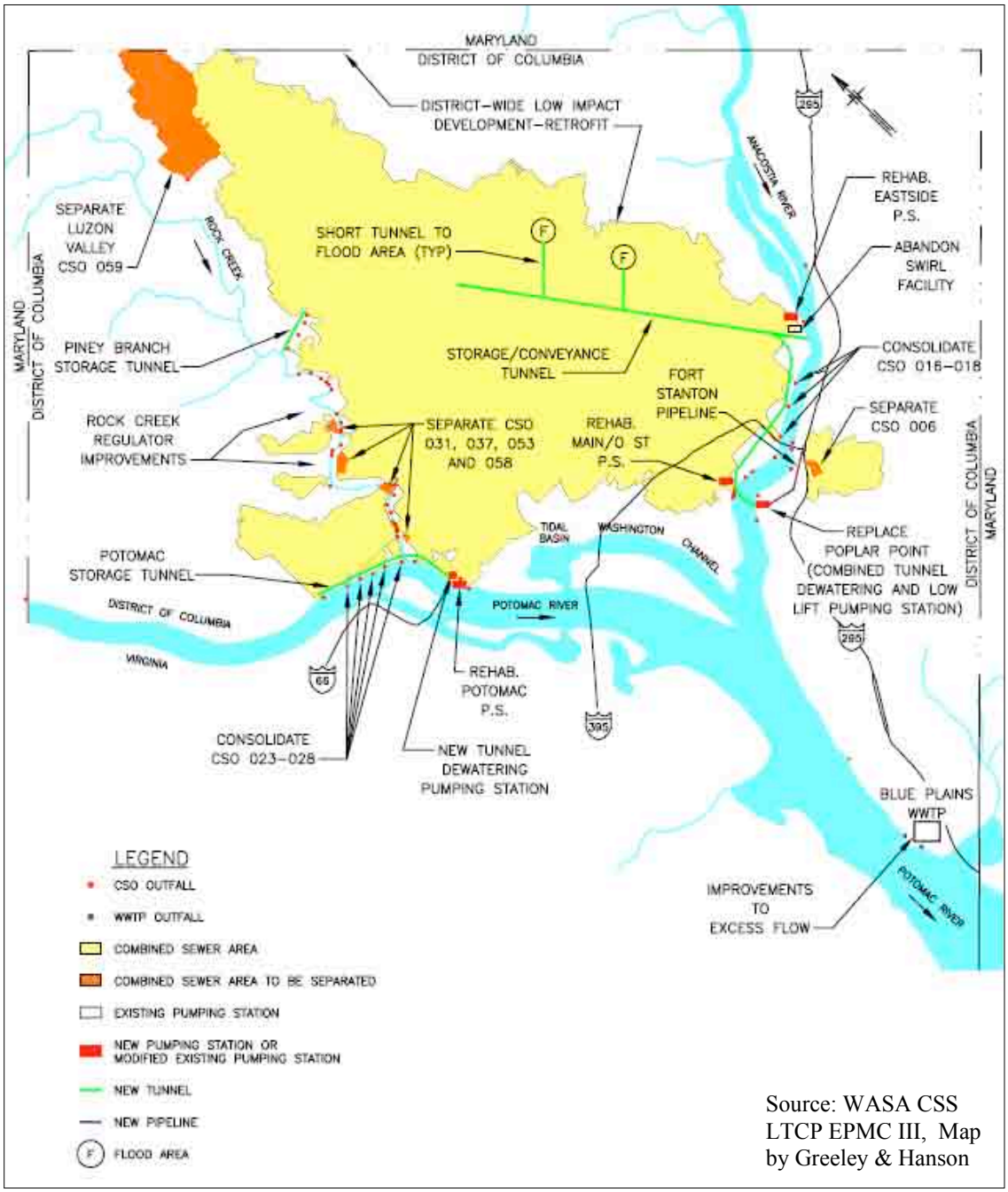
Combined sewer overflows (CSOs) occur during certain storm events when the capacity of the combined sewer system is unable to convey the mixture of wastewater and stormwater to the treatment plant. The EPA established a CSO Policy on April 19, 1994, permitting State and Federal authorities to use NPDES permits that would allow for overflows and still remain in compliance with the Clean Water Act. WASA's NPDES permits allow 60 outfall structures to the Potomac River, Anacostia River, and Rock Creek. When these overflows occur, the mixture of untreated wastewater and stormwater is discharged via these outfalls directly into the surrounding surface waters, which can adversely impact their water quality. WASA predicts the number of annual overflows per sewer system. As of August 2004, the annual prediction for overflows into the Anacostia was 452 overflows with a volume of 1,485 million gallons/year. The prediction for the Potomac was 277 overflows with a volume of 952 million gallons/year, while Rock Creek could expect 110 overflows releasing 52 million gallons/year. In total, overflows from combined sewer systems within the District could be expected to release 2,489 million gallons/year of overflow untreated water into the rivers in the region. (DCWASA, 2005)

The Long Term Control Plan

The *Combined Sewer System Long Term Control Plan* (CSS LTCP) (July 2002) provides the District's approach to reducing these overflows. It is WASA's intent to reduce these overflows to the extent practical; upon completion of the CSS LTCP improvements, the overflows should be reduced by approximately 95%. The CSS LTCP that was originally scheduled to be implemented over the next 40 years is now being implemented over the next 20 years[iii]. Key components

include (Figure 3.5): construction of storage tunnels, allowing storage and gradual release of CSO flows, separation of the combined sewers in several sections, consolidation and elimination of 13 outfalls, pumping station improvements, and Low Impact Development (LID)[iv]. A more detailed list of control program elements is found in Table 3.3.

Figure 3.5: Draft Long Term Control Plan



Source: WASA CSS LTCP EPMC III, Map by Greeley & Hanson

Table 3.3: Recommended Control Program Elements

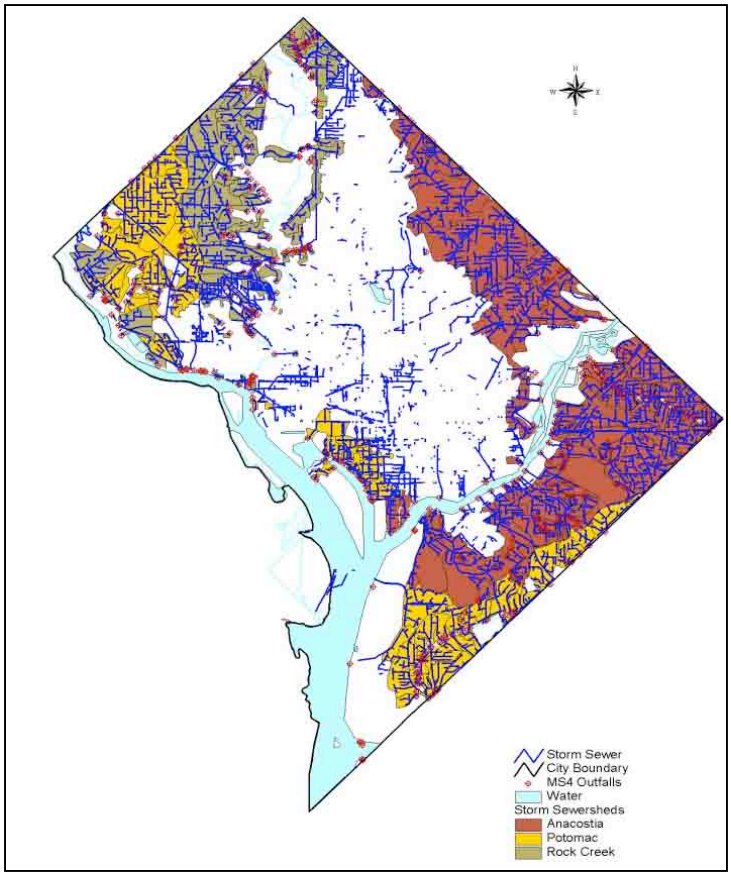
Location	CSO Controls	Description
Anacostia River	Rehabilitate Pumping Stations	Interim improvements at Main & O Street pumping stations necessary for reliable operation until rehabilitation is performed.
		Rehabilitate Main pumping station to 240 mgd firm sanitary capacity. Screening facilities for firm sanitary capacity only.
		Rehabilitate Eastside and O Street pumping stations to 45 mgd firm sanitary capacity.
		Interim improvements at existing Poplar Point Station necessary for reliable operation until replacement pumping station is constructed as part of storage tunnel.
	Storage Tunnel from Poplar Point to Northeast Boundary Outfall	49 million gallon storage tunnel between Poplar Point and Northeast boundary. Tunnel will intercept CSOs 004, 009-019 on the west side of the Anacostia. Project includes new tunnel dewatering pump station and low lift pumping station at Poplar Point.
	Storage/Conveyance Tunnel Parallel to Northeast Boundary Sewer	77 million gallon storage/conveyance tunnel parallel to the Northeast Boundary Sewer. Also includes side tunnels from main tunnel along West Virginia Ave and Mt. Olivet Ave., NE and Rhode Island and 4th St NE to relieve flooding. Abandon Northeast Boundary Swirl Facility upon completion of the main tunnel.
	Outfall Consolidation	Consolidate the following CSOs in the Anacostia Marina Area: CSO 016, 017, & 018.
	Separate CSO 006	Separate this in the Fort Stanton Drainage Area.
	Ft. Stanton Drainage Interceptor	Pipeline from Fort Stanton to Poplar Point to convey CSO 005 and 007 on the east side of Anacostia to storage tunnel at Poplar Point.
Blue Plains	Excess Flow Treatment Improvements	Four new primary clarifiers and improvements to excess flow treatment control and operations.
Potomac River	Rehabilitate Potomac Pumping Stations	Rehabilitate station to firm 460 mgd pumping capacity.
	Outfall Consolidation	Consolidate the following CSOs in the Georgetown Waterfront Area: CSO 024-028.
	Potomac Tunnel Dewatering Pumping Station	Construct new tunnel dewatering pumping station capable of dewatering the contents of the Potomac Storage/Conveyance Tunnel when full within 59 hours.
	Potomac Storage Tunnel	58 million gallon storage tunnel from Georgetown to Potomac Pumping station.
Rock Creek Park	Separate Luzon Valley and CSO 031 ,037, 053, and 058	Eliminate as CSO outfalls.
	Monitor CSO 033, 036, 047, and 057	Conduct monitoring to confirm prediction of overflows. If overflows are small, improve regulators. If regulators cause surcharge in interceptor, provide parallel relief interceptor.
	Piney Branch Storage Tunnel	9.5 million gallon Rock Creek Storage & Conveyance Tunnel, which will store combined sewer overflow from the Piney Branch CSO outfall 049.
	Connection to Potomac Storage Tunnel	Relieve Rock Creek Main Interceptor to proposed Potomac Storage Tunnel when it is constructed.

3.2.3 STORMWATER

Overview

The DC storm sewer system consists of approximately 8,200 catch basins, 600 miles of storm sewers, and 15 stormwater pumping stations located throughout the system. WASA maintains over 400 separate storm sewer discharges into local rivers and creeks. Certain portions and components of the District's storm sewer system are over a century old and are experiencing some structural deterioration. Ongoing and planned improvement projects are addressing this deterioration with system replacement and rehabilitation. Other projects include extensions to the system and relief of certain storm sewers.

Figure 3.6: DC Municipal Stormwater System



On April 19, 2000, U.S. EPA Region III issued a Municipal Separate Storm Sewer System (MS4) NPDES Permit to the Government of the District of Columbia for management of the separate storm sewer system. The City Council enacted D.C. Law 13-311 "Stormwater Permit Compliance Amendment Act of 2000" on January 22, 2001. Under the Act, the agencies tasked with implementing the MS4 permit are the Department of Health (DOH), and the Department of Public Works (DPW), and WASA. The Department of Transportation was added later. Among other things, the Act created the Stormwater Permit Compliance Administration within WASA to coordinate agency activities necessary to meet the permit requirement. It also established the Stormwater Permit Compliance Enterprise Fund to provide funds for compliance with the permit. WASA collects the stormwater fee along with the fee for water and sewer service and manages the fund. In August 2004, EPA issued a second permit to the District, primarily for compliance with TMDL's issued by the District DOH.

In December 2005, the District enacted the "District Department of the Environment Establishment Act of 2005". Under Section 3 (b)(2) of this Act, the Stormwater Administration will be transferred to the Department of the Environment within one year.

Regional Initiatives

There have been several Chesapeake Bay Stormwater Initiatives in the past few years that have included the partnership of the EPA, Chesapeake Bay Commission, District of Columbia, Maryland, and Virginia. The Chesapeake 2000 agreement produced the 2001 Chesapeake Bay

stormwater directive "Managing Storm Water on State, Federal and District-Owned Lands and Facilities" to better manage stormwater on government-owned lands and facilities, which comprise more than 13 percent of the watershed (Chesapeake, 2001). The goal is to prevent stormwater problems resulting from increased development and to remediate stormwater problems on lands that have already been developed, setting an example for public agencies and private landowners.

The 2001 Anacostia Watershed Restoration Agreement established new comprehensive goals for restoring water quality and living resources in the Anacostia basin, including the creation of additional riparian forest buffers, decreasing impervious surface area through low impact development, and establishing active river advocacy groups in each major Anacostia subwatershed.

3.3 ENERGY/TELECOMMUNICATIONS

Because the District imports nearly all of its electricity and natural gas and lacks the necessary natural resources in its jurisdiction to produce all of its own energy, it is reliant on external renewable energy sources and the associated supply and demand of availability and price. The importing of energy also means that the majority of the money spent by DC residents on energy is not retained by the District. The DC Comprehensive Energy Report 2003-2007 estimates that as much as 85% of the money spent on energy leaves the District's economy.

3.3.1 ENERGY DEMAND

Historical Energy Use

Although the population has declined over the last 50 years, energy consumption in the District has remained relatively the same. Residential consumption rates (which include single-family and multi-family dwelling units and public housing units) have not changed, but the expanding commercial and institutional markets have increased the demand for energy resources. According to the 2003-2007 Comprehensive Energy Plan, the commercial sector accounts for 62% (106.2 trillion Btu of energy used annually), whereas the residential sector accounts for 19.7% (33.5 trillion Btu). The transportation sector is the third largest energy consumer with 15.5% (26.5 trillion Btu)[v]. (See Figures 3.7 and 3.8) The commercial sector energy usage in the District accounts for 80% of the dollars spent on all energy sources.

Figure 3.7: DC Energy Consumption in trillion Btu's

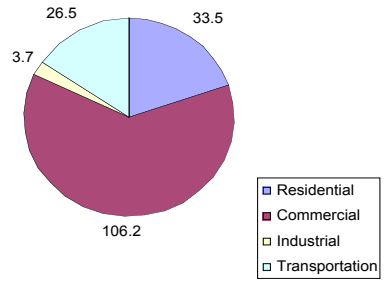
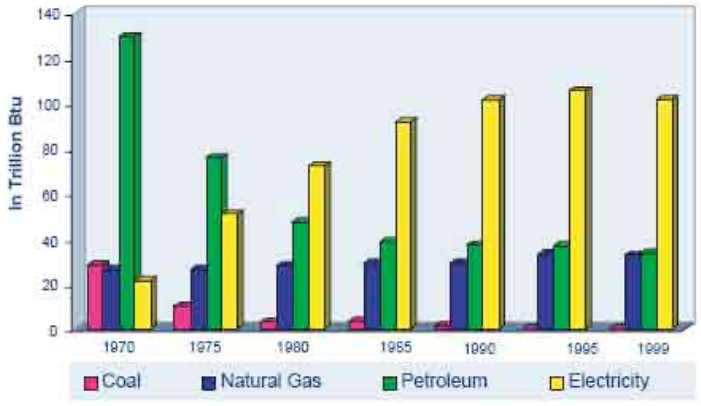


Figure 3.8: District Energy Consumption by Type



Source for Fig 3.7 & Fig 3.8: 2003-2007 Comprehensive Energy Plan

The District's residential, commercial, industrial and transportation sectors consume Btus directly through the use of coal, natural gas and petroleum products. Electricity is generated through the consumption of coal, oil and natural gas.

The residential and commercial/industrial sectors account for the bulk of electricity and natural gas usage. According to the DC Comprehensive Energy Plan (citing 2000 Census data), 162,467 households (65.4%) use natural gas and 60,016 households (24.2%) use electricity for their primary heating source. In the commercial/industrial sector, electricity represents 80% of the dollars spent on all energy sources. Natural gas and petroleum and minimal amounts of wood and coal comprise the remaining 20%. In the Industrial Sector, energy demand is typically low.

Future Energy Requirements

According to the District Public Service Commission (DCPSC), average household use of electricity is expected to increase by as much as 100 percent as more electrical appliances are used, while residential consumption will also be likely to increase. As the District pushes for increased density in residential areas, energy-efficient technology in new construction, renovations, and retrofits will likely offset some of the increased residential energy demand.

In the commercial/industrial sector, the types of commercial business that comprise the District's economic base are all growth business areas that increase the demand for energy resources. According to the Comprehensive Energy Report, four business categories represent 52% of the total establishments and 61% of the employees in the service. These businesses consist of (1) professional/ scientific/ technical services, (2) hospitality & food services, (3) health care, and (4) other.

In the Industrial Sector, demand could increase because aging equipment typically draws significantly more power. It is also important to note that power demand could rise or fall depending on whether or not industrial uses in the District expand or decline.

3.3.2 ELECTRICITY

Power plants generate high voltage electricity, which is released along transmission lines into the power grid to substations located throughout the District. From the substations, distribution lines deliver the electricity to transformers on the ground or on utility poles that reduce the voltage so it can be safely used by District consumers. District consumers can choose to receive electricity from a number of electric generation and transmission suppliers, while distribution of the electricity is provided only by Pepco. Pepco currently maintains 135 electric substations that distribute power to roughly 1400 overhead and underground feeder cables that carry power to its consumers.

The District contains two oil-fired power plants, Benning Road (550 MW) and Buzzards Point (256 MW), both operated by Pepco. According to the DC Comprehensive Energy Plan, since the mid 1970s when coal was phased out, oil has been the sole energy source used in electricity generation in the District. The dependence on generating stations in the city is not as prevalent as it once was, because the majority of electricity supplied to District residents currently comes from coal-fueled power plants located in Maryland. In addition, over the past 20 years with the emergence of cogeneration projects and purchased power, the District has access to and takes advantage of 450 megawatts from two utilities in Ohio. The DC Comprehensive Energy Plan

states that purchased power increased 224% between 1987 and 1988 when the Federal Energy Regulatory Commission approved a long-term firm capacity and energy contract.

Electricity as a share of total energy consumed in the District increased from 47.8% in 1980 to 60.5% in 1999 (See Figure 3.8). Natural gas, petroleum, and a small amount of coal constitute the remaining 39.5%.

Since 2001, Pepco has been sharing the electric supply market with alternative suppliers. The opening of the market is based on a 1999 DC Council legislation that permitted the DC Public Service Commission to introduce competition into the electric industry in the District. Per that legislation, District residents can choose the supplier of their electric generation and transmission services. However, as of April, 2005 Pepco supplies residential customers with 95% of their electricity, and only 5% comes from other suppliers (See Section 3.35 for more detailed information). As of April 2005, Pepco supplies commercial customers with 78.7% of their total electricity, and the remaining 21.3% comes from alternative suppliers. The commercial alternative supplier percentage in April 2005 was the highest it has been since deregulation started in 2001.

3.3.3 GAS

District consumers receive natural gas through transmission and distribution pipelines that deliver natural gas to compressor stations in and around the District. Figure 3.9 illustrates this process. Washington Gas is the main supplier to the District, delivering natural gas to its customers for more than 150 years. Currently, the utility serves more than 900,000 customers throughout metropolitan Washington, DC, and the surrounding regions in Maryland and Virginia. Across the Washington metro area, nearly 195,000 customers buy natural gas from competing energy companies. Currently, more than 25,000 residential and commercial customers voluntarily buy their natural gas from qualified energy supply companies in the District. The regulated utility company transports the natural gas through interstate natural gas pipelines to the Washington metropolitan area. At that point, gas enters the Washington Gas delivery system and is brought directly to District neighborhoods by Washington Gas. (Figures 3.9 and 3.10 illustrate this process).

Figure 3.9: Market Participants in Natural Gas Supply in the District

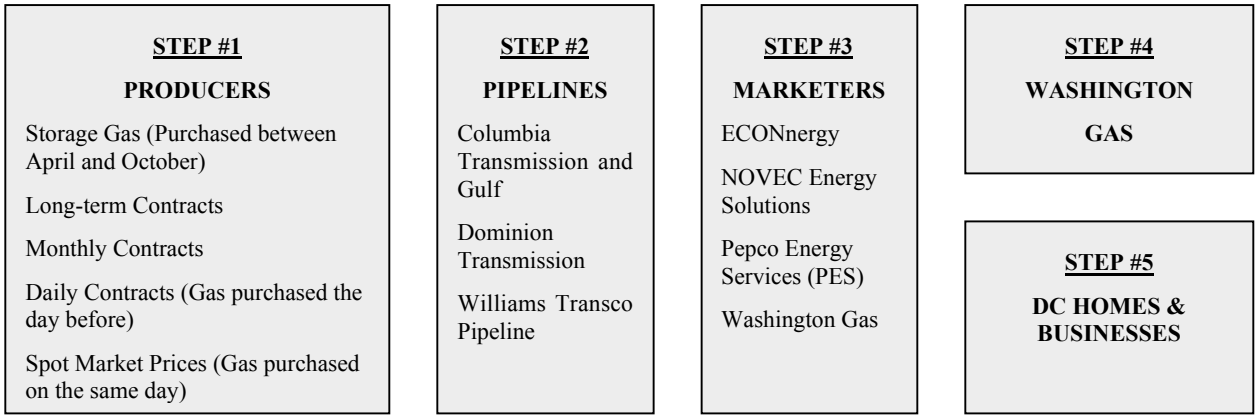
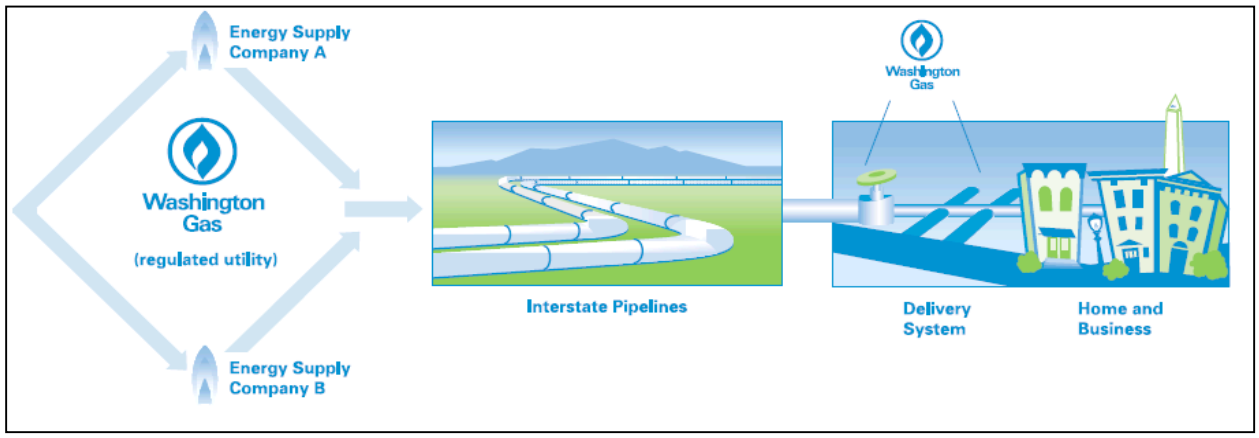


Figure 3.10: Washington Gas Customer Choice



Source: 2004 April Washington Gas Consumer Bulletin.

In terms of consumption in the District, total residential gas usage is twenty percent greater than total commercial gas usage. Consumption of natural gas has remained stable for the past 25 years, (+/- 30 trillion Btu), while petroleum and coal consumption have decreased dramatically.

3.3.4 Energy Initiatives

In 1986, the DC Department of Energy released the Comprehensive Energy Plan I (CEP I). This plan was the first District initiative that promoted energy efficiency, aggressive use of renewable energy sources, and the adoption of legislative, administrative and regulatory mechanisms to monitor and enforce better utilization of energy in the District. From 1986 to 1990, CEP I was successfully implemented: the policies and recommendations achieved a 6% reduction in the total amount of energy consumed in DC in 1982. This reduction roughly equated to more than $100 million or 72 million gallons of fuel oil.

The second DOE initiative (CEP II) was scheduled to be written and implemented between 1991 and1996, but was never completed. The CEP III was released in 2003 and its implementation schedule extends to 2007. To summarize, the CEP III produced 43 strategic recommendations that are broadly organized into an increase in energy awareness and innovation, enhancement of energy availability and affordability, and the promotion of security and energy collaboration (public/private partnership). The key CEP III goal is a citywide reduction in energy consumption per year of 1%.

3.3.5 Introduction of Competition

The DCPSC regulates the monopoly of electric and gas distribution services of Pepco and WGL respectively, and, where feasible, the introduction of competition in other segments of the electric, gas, and telecommunications industries[vi].

The DCPSC has statutory authority over new providers of local telecommunications services called “Competitive Local Exchange Carriers” (CLECs). Retail electric competition legislation in 1999 granted the Commission jurisdiction to restructure the electric industry to permit competition for generation and transmission services, including the licensing of alternative electric generation and transmission suppliers (AES). The Commission implemented retail electric choice for electric generation and transmission services in January 2001. The

Commission introduced competition for commodity gas through a series of Gas Tariffs beginning in 1999. In 2003, the Commission began licensing alternative commodity gas suppliers (AGS), a process previously undertaken by Washington Gas.

As of May 18, 2004, the Commission had approved nearly 190 CLECs, 17 AES and 10 AGS. However, all of these companies are not currently operating in the District. As of the end of 2002, 37 CLECs were providing service. (A survey for the results as of the end of 2003 is underway.) As of May 1, 2004, 11 AGS and 3 AES had customers in the District.

The DC Council passed legislation at the end of 1999, which permits the DCPSC to introduce competition into the electric industry in the District. Since January 2001, consumers can choose the supplier of their electric *generation and transmission services*, but Pepco is the only *distribution company*.

Current Electric Generation & Transmission Suppliers include:

- Pepco - Serves Residential and Commercial Customers
- Pepco Energy Services (PES) - Serves Residential and Commercial Customers
- Washington Gas Energy Services (WGES) - Serves Residential and Commercial Customers
- Select Energy - Serves Commercial and Industrial Customers
- Amerada Hess - Serves Residential and Commercial Customers
- BGE Homes - Commercial Customers Only
- Constellation New Energy - Commercial Customers Only
- Reliant Energy Solutions East - Commercial Customers Only
- Consolidated Edison Solutions - Commercial Customers Only

Competition has also been introduced into the natural gas market in the District. Washington Gas Light is the only distribution company in the District, but consumers can choose suppliers from which to buy the commodity. As of August 2005, residential customers could choose among five suppliers; however, 91% of gas used by residents came from Washington Gas, while only 9% came from the four alternative suppliers. The alternative supplier percentage for residential customers peaked in May 2003 at 24%. Current suppliers include:

- ECONnergy
- NOVEC Energy Solutions
- Pepco Energy Services (PES)
- Washington Gas Energy Services (WGES)
- Washington Gas Light

Also as of August 2005, commercial customers could choose among 11 suppliers; Washington Gas supplied 70% of commercial gas used, and the remaining 30% came from alternative suppliers.

3.3.6 TELECOMMUNICATIONS

Fiber Optics, Cable & Telephone

The Office of Chief Technology (OCTO) is responsible for improving, enhancing, and expanding wireless technology, communications systems, and electronic commerce in the District. Their office develops and enforces policies and standards for information technology in the District government and identifies where and how technology can systematically support the business processes of the District's 68 agencies.

OCTO has initiated DC-NET, a fiber optic telecommunications network supplying District consumers with a fully redundant, voice, data, video, and wireless communications services (Figure 3.11). The system consists of interconnected strands of optical plastic from various providers that, when completed, will connect the majority of government and quasi-governmental services in the District. These include police, EMA and fire radio towers; police, fire and emergency management facilities; administrative buildings; public schools and libraries; recreation and community centers; District-owned hospitals and clinics; and semi-governmental entities such as WASA, WMATA and UDC. The physical network is composed of "backbone" and "access" fiber rings. The DC-NET system has four: the Level 3 network loop, Fire Zone South network loop, Comcast network loop, and the Starpower ODC1 to ODC2.

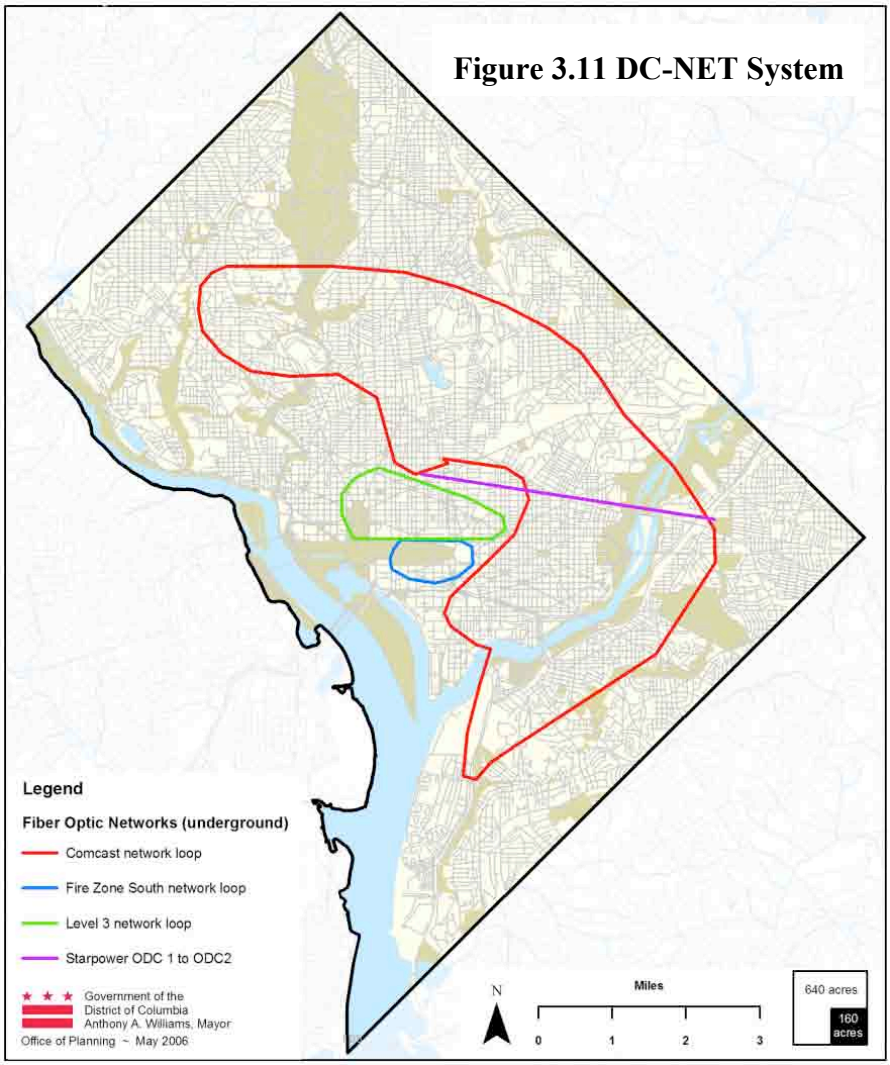


Figure 3.11 DC-NET System

Cable

The District of Columbia Office of Cable Television and Telecommunications (OCTT) operates within the cable television industry. The agency regulates all cable television providers within the District and the city's two municipal government channels – City Cable Channel 16 and City Cable Channel 13. Channel 16 provides residents with information about District services and opportunities and Cable Channel 13 shows live and recorded activities of the D.C. City Council and its various committees. Together these channels are intended to provide District residents access to the activities and processes of their government.

Telecommunications

The telecommunication industry in the District must be framed in the context of the 1996 Telecommunications Act. The goal of this legislation was to open local telephone service to competition, offering consumers choice and greater availability for more advanced broadcasting and cable, telecommunications, information and video services. The Act denied local exchange carriers (LECs) the monopoly on telephone service and required these LECs to make portions of their networks available to competing companies.

The District of Columbia Telecommunications Competition Act of 1996 allowed the DC Public Service Commission to transition local markets to competition. According to DCPSC's Annual Survey of Verizon DC and competitive local exchange carriers (CLEC)s, at least 43 Competitive Local Exchange Carriers (CLECs) provided service in DC.

- CLECs had 18.0% of lines. (U.S. average 18.5%)
- CLECs' share of residential lines was 15.9%.
- CLECs' share of commercial lines was 18.7%.
- CLECs had 35.7% of local DC telecommunications industry revenues.
- CLEC revenues were $134 million compared with $90 million for Verizon as of the end of 2003.

Local Service Provider Options for District residential customers as of March 2005 included:

- Local Exchange Service: ACN*, Excel*, Lightwave, MCI*, MetTel, Sprint* (does not offer residential service to new customers), Starpower d/b/a RCN*, Trinsic*, USTel*, VarTec Telecom, Inc*, and Verizon*.
- Prepaid Local Service: Ax (877-Dial Tone)*, Cat Communications (CCI)*, Comm South*, 1-800-Reconex (US Tel)*, and Metro Teleconnect (Cellular Rentals)*.
- Wireless or Cellular (bundles local and long distance; not tariffed at the DCPSC).
- Pay Telephones or Phone Cards.
- Voice over IP (Internet Protocol) Telephony (not tariffed at DCPSC): Metro Teleconnect (Cellular Rentals)*, AT&T, Verizon, and Vonage.

* Had residential customers as of December 31, 2003.

Wireless technology was not anticipated by the 1996 Telecommunications Act, and has not been substantively addressed by local competition.

3.4 SOLID WASTE

3.4.1 SOLID WASTE COLLECTION

The District generates approximately 650,000 tons of Municipal Solid Waste (MSW)[vii] per year, which is collected and processed by both public and private facilities. The District Department of Public Works (DPW) Solid Waste Management Administration is responsible for waste collection services to all government entities and approximately 110,000 single-family homes and small residential buildings with up to three living units. Private haulers handle the residual bulk trash from commercial and multi-family residential establishments, including condominium and apartment buildings with more than three units. Approximately 70% or 400,000-450,000 tons of MSW in DC, comes from commercial and multi-family residential sources, while 200,000 tons is generated from residential and government sectors.

In addition to waste collection, the DPW collects 5,000 tons of bulk trash by appointment and provides recycling service, household hazardous waste collection, leaf and yard waste collection, and dead animal removal. The DPW is also responsible for street and alley cleaning and solid waste education and enforcement.

3.4.2 SOLID WASTE REMOVAL

In addition to 650,000 tons of District MSW generated per year, an additional 300,000 tons per year are imported from the suburbs or Virginia and Maryland. The District has the capacity to handle this imported MSW and benefits from the revenue. Every bit of this MSW has to be removed by truck from the area (currently to landfills to the south as far away as North Carolina) because there are no active incinerators or landfills in the District. Nor are there facilities for rail or marine barge transfer of municipal solid waste in the District; land use, economic, engineering and environmental factors limit the feasibility of using such transfer technologies. Due to these limitations, an efficient truck transfer system is a key priority for the District.

3.4.3 TRASH TRANSFER STATIONS

What Is a Solid Waste Transfer Facility?

A solid waste transfer facility is a light industrial facility where trash collection trucks discharge their loads for compacting. Once compacted, trash is reloaded onto larger vehicles) for shipment to a final disposal site, typically a landfill or waste-to-energy facility. These facilities are typically fully enclosed. Workers screen incoming wastes on the receiving floor or in an earthen pit, recovering materials from the waste stream that can be recycled and separating out any inappropriate wastes (e.g., tires, large appliances, automobile batteries).

There are five trash transfer stations in the District, three of which are privately owned and two of which are District operated (See Figure 3.12). The Fort Totten and Benning Road facilities are maintained by the District. Of the MSW collected by the DPW, approximately 60% of MSW is currently processed by the Fort Totten Station and the remaining 40% is processed by the Benning Road facility. With the scheduled improvements to the Fort Totten Station and the recently renovated Benning Road Station, the District DPW will be able to process more than

4,000 tons daily, including trash from Waste Management and BFI that formerly operated two additional private sector trash transfer stations. The Fort Totten and recently upgraded Benning Road trash transfer stations capacities are actually limited by the logistics of the arrival, dumping, and departure of the delivery trucks and the efficiency of the transfer station crew to sort and load the trash into the long-haul trailers, rather than the station components.

There are three private commercial trash transfer stations in the City: "Queens Chapel" at 2160 Queens Chapel Rd. NE, operated by Waste Management; "ETW" at 1st and O St. SE, operated by Eastern Trans Waste and occupying land being acquired for the new baseball stadium, and W Street operated by BFI[viii].

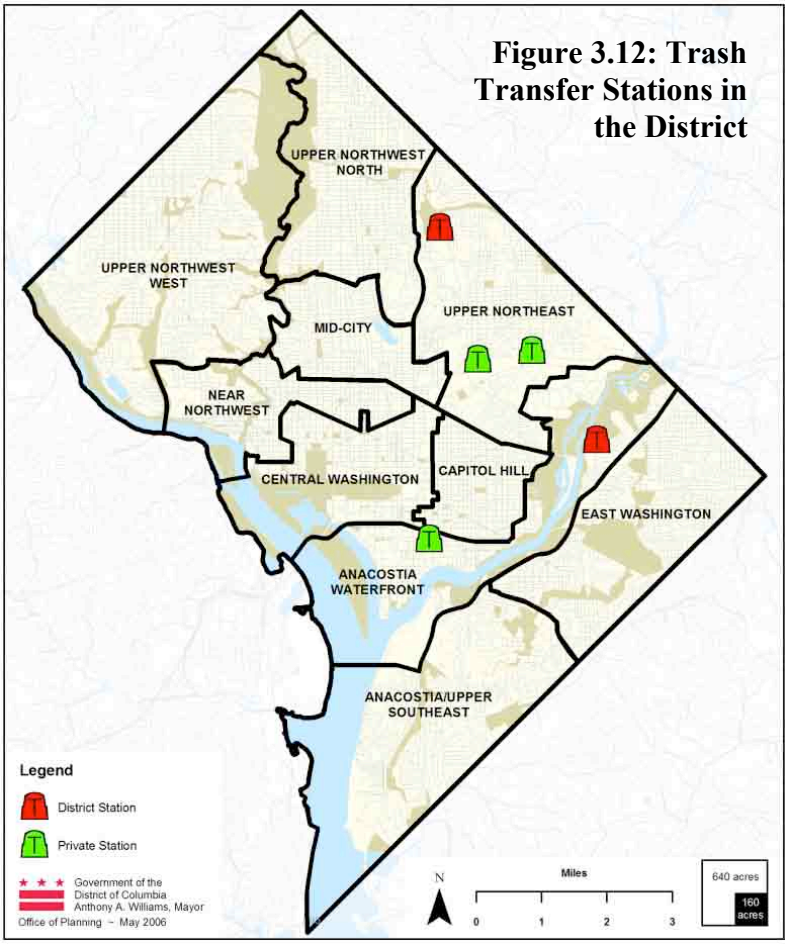


Figure 3.12: Trash Transfer Stations in the District

3.4.4 CONSTRUCTION & DEMOLITION DEBRIS

While the District does not currently have a Construction and Demolishing debris (C&D) transfer station, it does permit disposal of a limited amount of C&D at the Fort Totten Station. However, large-scale commercial building debris disposal is handled privately. The majority of C&D is currently processed by several transfer stations in the surrounding areas of Southern Maryland and Northern Virginia. According to the EPA's Characterization of Building-Related Construction and Demolition Debris in the United States, the materials most frequently recovered and recycled are concrete, asphalt, metals, and wood. In 1995, Anne Arundel County, Maryland concrete and asphalt processors were receiving, crushing and recycling over 850,000 tons per year, which includes C&D debris imported from the District.

3.4.5 RECYCLING AND OTHER ENVIRONMENTAL INITIATIVES

Recycling

District residents generate over 20,000 tons of recyclables per year, or 10% of total municipal waste. District recyclables are sorted at the Eagle Recovery Facility on North Capitol Street for sale and remanufacturing. The Eagle facility processes commercial and residential recyclables for DC, Maryland, & Virginia.

According to the DC Office of Property Management, the recycling rates in the District are poor in comparison to other cities. For example, Los Angeles, Seattle, Portland, and San Francisco have recycling rates in excess of 40%. Montgomery County, Maryland, recycles approximately 37%.

The District's residential and commercial recycling programs are managed by the DPW. Their Office of Recycling is responsible for education, technical assistance, outreach, and enforcement. Recycling is mandatory for all commercial establishments. All District businesses, organizations and apartments must recycle and failure to do so results in fines ranging from $25 to $1000.

The federal properties' recycling programs and education are led by the Office of Property Management (OPM). In 2002, the reported net revenue generated from recycling efforts totaled approximately $26,000. The resale of recycled materials comprised roughly 60% of the total revenue and fines constituted the remaining 40%. The Public Report of Recycling (2002) estimated that District recycling efforts saved nearly $938,000 diverting materials from landfills. In 2002, Mayor Anthony Williams implemented a three-year timeline for all District agencies and facilities to achieve DC Code 8-1006, a recycling target of 45% (by weight) for the separation and collection of recyclable paper for total solid waste stream. The OPM is the lead agency for government recycling and is coordinating with each agency to ensure recycling services are being effectively implemented.

Waste to Energy

Many new landfills collect potentially harmful landfill gas emissions and convert the gas into energy. The EPA's Landfill Methane Outreach Program (LMOP) is an initiative program that promotes the use of landfill gas as a renewable, green energy source. Landfill gas is primarily carbon dioxide and methane, both by-products of the decomposition of solid waste. While there are currently no landfill gas to energy (LFGE) projects or candidate landfills in the District, because there are no landfills, Virginia Department of Environmental Quality (DEQ) encourages and supports, through regulatory and non-regulatory means, LFG energy recovery at candidate landfill sites. Maryland's Department of the Environment and Energy Administration, Alternative Energy Programs is developing four operational projects.

4.0 GROWTH FROM PROJECTED LAND USE CHANGES

Table 4.1 provides a brief snapshot of projected infrastructure demands per water service area based on estimated growth in employment and households. The data used for household and employment projections were based on the transportation analysis zones (TAZ) boundaries and includes land use change areas, infill/revitalization areas, and conservation areas. Table 4.1 also shows the associated water demand for each area based on calculations that assume 50 gallons per person per day (gpd) for each new person employed and 183.6 gpd for each new household. The household estimate is derived from the assumption that water use averages 85 gallons per person per day and an average of 2.16 people per household – based on the 2000 Census for DC). Figure 4.1 shows the highest water demand per water service area in the District.

The most recent detailed WASA potable water demand projections are contained in their 2002 Water System Facilities Plan. In this plan, conceptual facility planning studies were conducted for each service area to address the current and future system needs and concerns. Table 4.2

shows these projections by service area. Although the population growth projections in 2002 differ slightly from those used in the Comprehensive Plan, a comparison of the two tables shows that the WASA projections for water demand in Table 4.2 are slightly larger in all areas except the Low Service Area, where the WASA projections are slightly less. The conclusion is that the WASA projections and resulting requirements that they imply are conservatively larger or sufficiently close to growth projections for the Comprehensive Plan to remain valid.

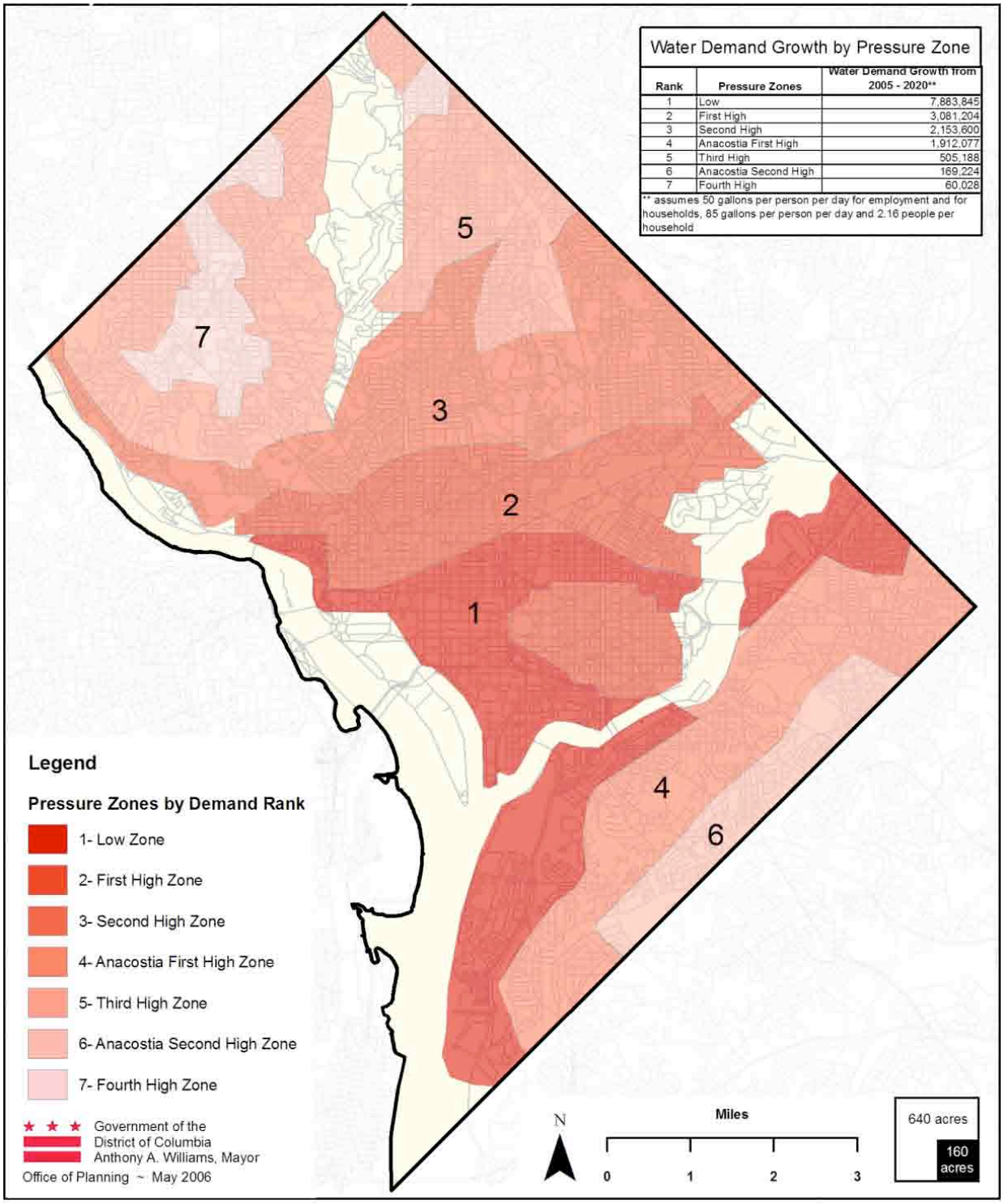
Table 4.1: Water Service Area Household, Employment, and Water Demand Projections, 2005-2025 based on Comprehensive Plan Growth Estimates

Water Service Area	Employment Change from 2005 - 2025	Household Change from 2005 - 2025	Water Demand Growth from 2005 - 2025
First High	33,176	13,765	4,186,005
Second High	9,559	8,396	2,019,375
Third High	-238	4,700	851,006
Fourth High	-188	1,054	184,152
Anacostia 1st High	5,222	8,045	1,738,128
Anacostia 2nd High	270	1,485	286,218
Low	90,799	19,990	8,210,181
Total	**138,600**	**57,435**	**17,475,066**

Table 4.2: DCWASA Current and Projected Water Demands (mgd)

Service Area	Year 2000			Year 2020		
	Annual Average Day	Maximum Day	Peak Hour	Annual Average Day	Maximum Day	Peak Hour
First High	35.0	51.4	101.8	40.0	58.8	116.4
Second High	22.6	29.8	43.2	25.6	33.8	48.9
Third High	25.4	31.2	54.9	27.6	33.9	59.6
Fourth High	7.0	11.4	15.4	7.6	12.4	16.7
Low	26.5	36.3	70.0	32.7	44.8	86.3
Anacostia 1st High	14.1	20.4	40.6	15.9	23.7	45.8
Anacostia 2nd High	6.2	9.1	19.8	7.1	10.4	22.6
Total	**136.8**	**189.6**	**345.7**	**156.5**	**217.8**	**396.3**

Figure 4.1: Water System Service Areas Ranked by Growth in Demand 2005-2025



5.0 INFRASTRUCTURE ASSESSMENT

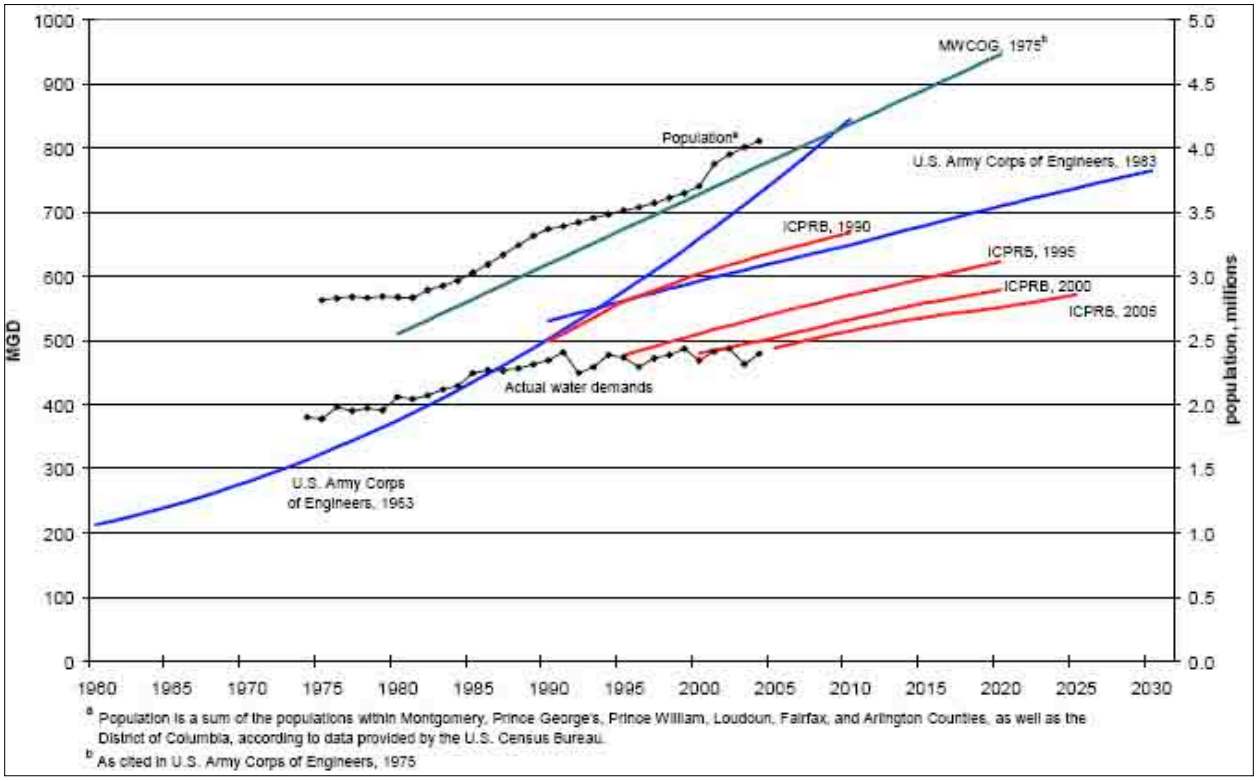
5.1 POTABLE WATER TREATMENT, QUALITY, & DISTRIBUTION

5.1.1 POTABLE WATER CONSTRAINTS AND ISSUES

5.1.1.1 Potable Water Supply

As stated in the Historical Water Use Section 3.1.2, The ICPRB year 2005 assessment concluded that the water supply system developed 25 years ago is adequate to meet 2025 demand under a repeat of the worst meteorological and stream flow conditions in the historical record. Furthermore, the system is able to meet estimated future water supply demand in 2045 given a repeat of the same drought conditions. Figure 5.1 shows the projected water demand (mgd) against future population towards 2030.

Figure 5.1: Washington Metropolitan Area Average Water Demand, Forecasts and Actual Demands



Source: Water Supply Reliability Forecast for the Washington Metropolitan Area, Year 2025 (ICPRB, 2005)

Even though current projections are that water supply is adequate to 2025, there are uncertainties associated with the future. For example, climate change may have an impact on resources that would change the study results, especially given the sensitivity of Potomac reservoir storage to changes in historical stream flow data. A positive trend is the water conservation of recent years. The ICPRB 2005 study noted that single-family household water use rates declined approximately 18 percent between 1990 and 2000 in the Washington area. The study also noted

that supplier programs encouraging conservation were potentially an important factor for this trend. Conservation programs and education on the availability of low energy and water use appliances and plumbing codes that encourage water conservation will continue to play an important part in the process of insuring adequate supply to all District consumers.

5.1.1.2 Potable Water Distribution

In general, distribution system capacity is not an issue in the District. The design of the infrastructure was based on a population that at one time was much larger than at present. There will likely be street-specific capacity issues related to expanding development in previously vacant areas, but these issues can only be evaluated on a case-by-case basis as new development permits require site assessments. WASA approaches capacity issues more comprehensively by evaluating current and future District-wide needs and concerns by water service area (Figure 5.2). As noted in Section 4.0, the most recent water demand projections from their 2002 Water System Facilities Plan are reasonably close to demand that would be projected from growth assumed in the Comprehensive Plan, and the evaluation for each service area from the 2002 plan remains valid. The evaluation for each service is summarized as follows:

Low and First High Service Areas

These service areas are highly reliable and have no significant deficiencies.

Second and Third High Service Areas

Low pressure problems occur in Second High under peak demand conditions and when key facilities are out-of-service. In particular, the 42-inch main along Taylor Street exhibits negative pressures in the segment north of the Soldiers' Home property under high demand conditions.

Water quality is a concern for the long segment of 16-inch Third High main along Harewood Road that dead-ends at Michigan. However, CIP plans are in progress in WASA's Capital Improvement Program (CIP) to alleviate this condition.

Fourth High Service Area

Operational problems continue to exist in the system, including less than optimal pressures at some high elevations in this service area. However CIP plans are in progress to alleviate this condition.

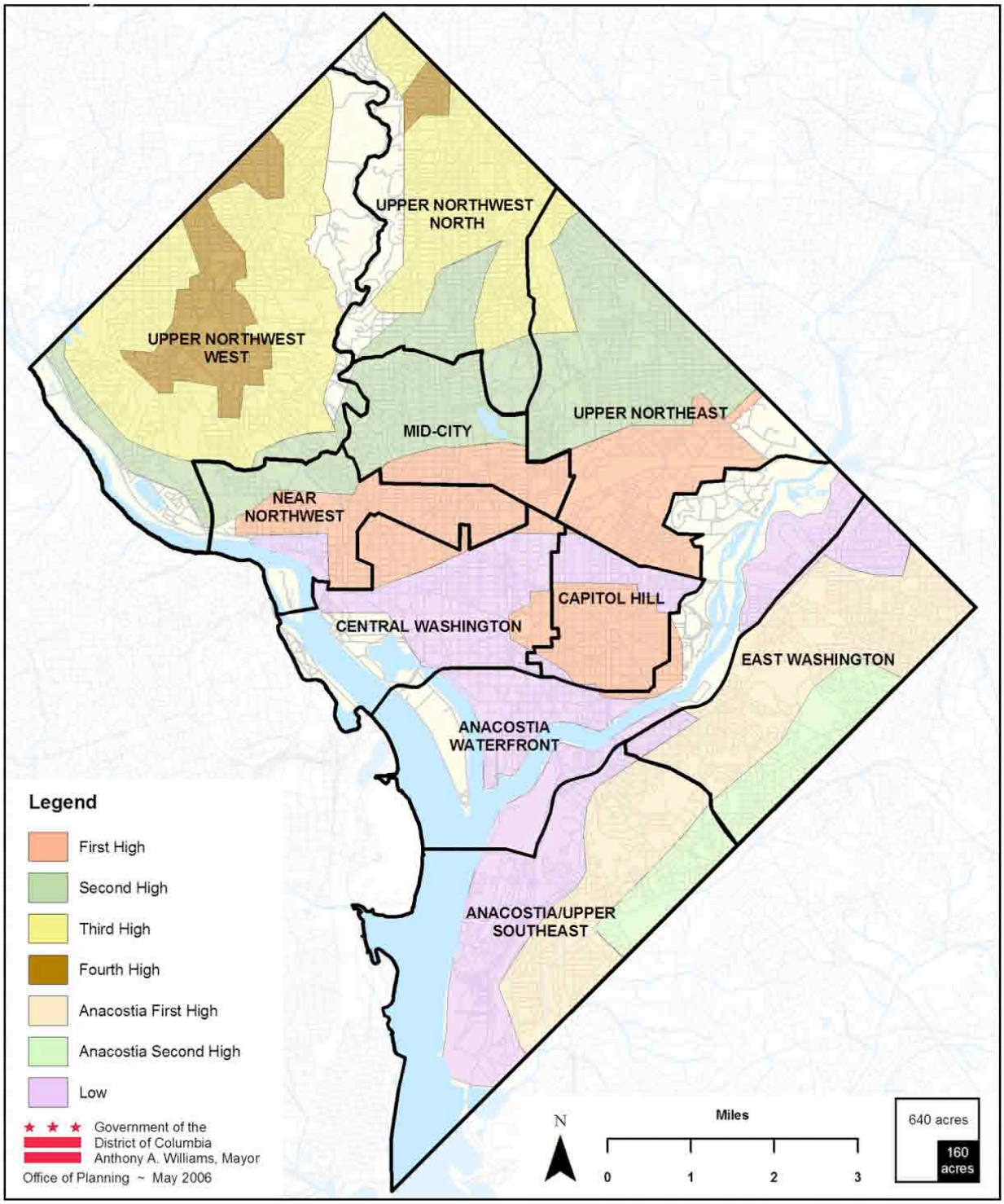
Anacostia First and Second High Service Areas

Several distinct areas in the southern portion of the Anacostia First High Service Area have experienced less than optimal pressures. These areas are in the vicinity of Hadley Hospital, Greater Southeast Hospital, and Congress Heights.

The Fort Stanton Reservoirs in Anacostia First High are not being effectively utilized. The two reservoirs are maintained nearly full to sustain pressures in the southern portions of Anacostia First High, and, as a result, typically less than 25% of the available 13 million gallons is permitted to fluctuate. The reliability of the distribution system in Anacostia First High north of the Anacostia Pumping Station is limited. The entire northern portion of Anacostia First High is currently fed by a single 30-inch main from the Anacostia Pumping Station (approximately 6,500

feet). The reliability of the Anacostia Pumping Station is a concern due to its aging structure and equipment and the vulnerability of its electrical supply; however, a CIP project is under design to alleviate this condition.

Figure 5.2: Water System Service Areas



5.1.2 PLANNED POTABLE WATER SYSTEM IMPROVEMENTS

The existing water system supports the District's future needs for water. The majority of the planned improvements to be made to the water system in WASA's Capital Improvement Program involve normal maintenance and upgrades to keep pace with population growth and new development. This includes the addition of new water storage facilities, increasing the capacity of certain water mains, and upgrading pump stations. The Lead Service Replacement Program removes lead pipes from the distribution system and improves water quality for the public. This, in addition to removing cross-connections, dead ends, and other water quality and reliability projects that WASA is implementing, will improve the water system further and ensure it continues to meet the District's needs. That said, the District must consider the potential impacts of future new development and increased density in areas of redevelopment /revitalization and work proactively to ensure that water infrastructure will be able to meet the potential future demands.

5.1.2.1 Overview of WASA's Capital Improvement Program (CIP)

WASA remains in a constant state of assessing the reliability of water and sewer system and the integrity of the conveyance pipes. To the extent that maintenance, corrosion, and break reports reveal problems, specific upgrades are factored into the CIP. WASA's CIP provides for upgrades and improvements to the existing water, wastewater, combined sewer, stormwater, and sanitary sewer systems infrastructure and distribution system and the implementation of new technology.

The 10-year CIP budget (FY 2004 – 2013) totals $2.1 billion and is funded by user fees and from outside sources such as the USEPA and WASA's regional partners in Maryland and Virginia. WASA purchases 75 percent of the water produced by the Washington aqueduct's two treatment plants, and thus is responsible for 75 percent of Washington aqueduct's operating and capital expenses. Percentage of 10-year funding (FY 2004 – FY 2013) by program is as follows:

- Water: 26.9%, $568 million
- Washington Aqueduct (WASA Share): 6.0%, $127 million
- Combined Sewer System LTCP: 21.7%, $460 million
- Sanitary Sewer: 6.7%, $142 million
- Stormwater: 1.0%, $22 million
- Blue Plains Wastewater Treatment: 33.7%, $713 million
- Capital Equipment: 4.0%, $84 million

Wastewater

The majority of wastewater project improvements are concentrated on facilities upgrades in the liquids processing and solids processing programs.

Water

Planned water distribution system improvement programs target the rehabilitation or replacement of undersized or defective mains in the system and cleaning and lining large diameter water mains. Another major program is targeted at flushing the lines in order to eliminate the potential for stagnant water to accumulate at the ends of water mains. The CIP has also identified the need for several new storage facilities to support growth projections by providing additional water pressure to certain areas of the District and to provide emergency backup service. Two million gallons of elevated storage is needed in the southern half of the Anacostia 1st High service area.

WASA has worked with the District and reached an agreement to site this water storage tank at St. Elizabeth's Hospital. Currently, necessary approvals and permits are being pursued, including historic preservation approvals that will insure no historic structures on the campus are negatively impacted. Another two million gallon elevated storage tank is needed in the Fourth High Service Area in the upper northwest west.

Combined Sewer

The major goal of the combined sewer capital improvements target the separation of combined sewers in several sections of the District. Projects that support this goal include the construction of four large storage tunnels, which will allow the storage of CSO flows from storm events until they can be gradually sent to Blue Plains for treatment (with two tunnels located near the Anacostia River, one near the Potomac River and one near Rock Creek). They also include consolidation and elimination of 13 of 59 outfalls, including four outfalls on the Anacostia River.

Stormwater & Sewer

The trunk/force sewer program includes providing new large diameter storm sewers and pumping station force sewers that serve new development, replacing undersized sewers, or replacing or rehabilitating storm sewers that have reached their useful life or have experienced structural deterioration.

Blue Plains

WASA's CIP program includes several steps to mitigate the odor associated with biosolids at the Blue Plains Water Treatment Facility. The $257 million Egg-Shaped, Anaerobic Digestion Facilities will replace the existing digesters, resulting in a less odorous, more consistent end product. The $79.4 million Dewatering Facilities Plan includes biosolids cake storage to minimize odors that occur from biosolids being stored for extended periods. The $19.8 million Gravity Thickening Facility Upgrade includes funds for the addition of chemicals to the influent flow for odor control.

5.1.2.2 The Washington Aqueduct CIP

The 10-year CIP for Washington Aqueduct capital improvements is $127 million. Of this amount, improvements to the two treatment plants total approximately $28 million, while improvements for storage at the Georgetown Reservoir and transmission systems (pumping stations and transmission lines) require approximately $17 million (WASA share).

Additionally, the Washington Aqueduct is in the process of evaluating alternatives under the National Environmental Policy Act for managing its water treatment residuals in order to comply with its National Pollution Discharge Elimination System (NPDES) permit. The treatment process removes solid particles, which have historically been returned to the Potomac River. The most recently issued permit, however, precludes their discharge to the river. Alternatives under evaluation include ones that would add additional facilities for dewatering at the Dalecarlia water treatment/reservoir site and trucking these residual solid particles to areas outside the District for disposal. The CIP identifies projects totaling $50 million for WASA's share of this requirement.

5.1.2.3 Future Potable Water Distribution Improvements That Are Programmed

WASA's Capital Improvement Program (CIP) for the water system includes many upgrades and improvements to pumping, storage and distribution. The CIP is updated annually to address the ever-changing demands on the system. Major CIP projects and programs are listed below:

2nd High and 3rd High Proposed Improvements

- Construct a 5 million-gallon storage reservoir.
- Construct a new 16-inch Third High main along Michigan Avenue.

4th High Proposed Improvements

- Construct 2 million-gallon elevated storage tank.
- Upgrade the Fort Reno Pumping Station.
- Upgrade Fourth High interconnections with WSSC.

Anacostia Service Area Proposed Improvements

- Create a new pressure zone in the southern portion of Anacostia First High south of W Street, SE and install a new 2 million-gallon elevated tank at the St. Elizabeth's' Hospital site at an overflow elevation of 310 feet to serve the new zone.
- Install a new 24-inch main from Anacostia Pumping Station to W Street, SE and Fort Stanton Reservoirs to MLK Jr. Avenue, SE to improve system reliability.
- Replace a segment of 20-inch main (which has a low pressure rating) along MLK Jr. Avenue, SE to Anacostia Pumping Station.
- Replace segment of 20-inch main (which has a low pressure rating) along Minnesota Avenue, SE from the Anacostia Pumping Station to Pennsylvania Avenue, SE.
- Replace the Anacostia Pumping Station and include pumping to new pressure zone.
- Replace a segment of 20-inch main (which has a low pressure rating) along MLK Jr. Avenue, SE from Milwaukee Place, SE to Upsal Street, SE ,
- Replace the 12-inch main with a history of breaks at Livingston Road, SE.
- Replace many older small diameter water mains in the southern portion of Anacostia First High in advance of the implementation of the new pressure zone.

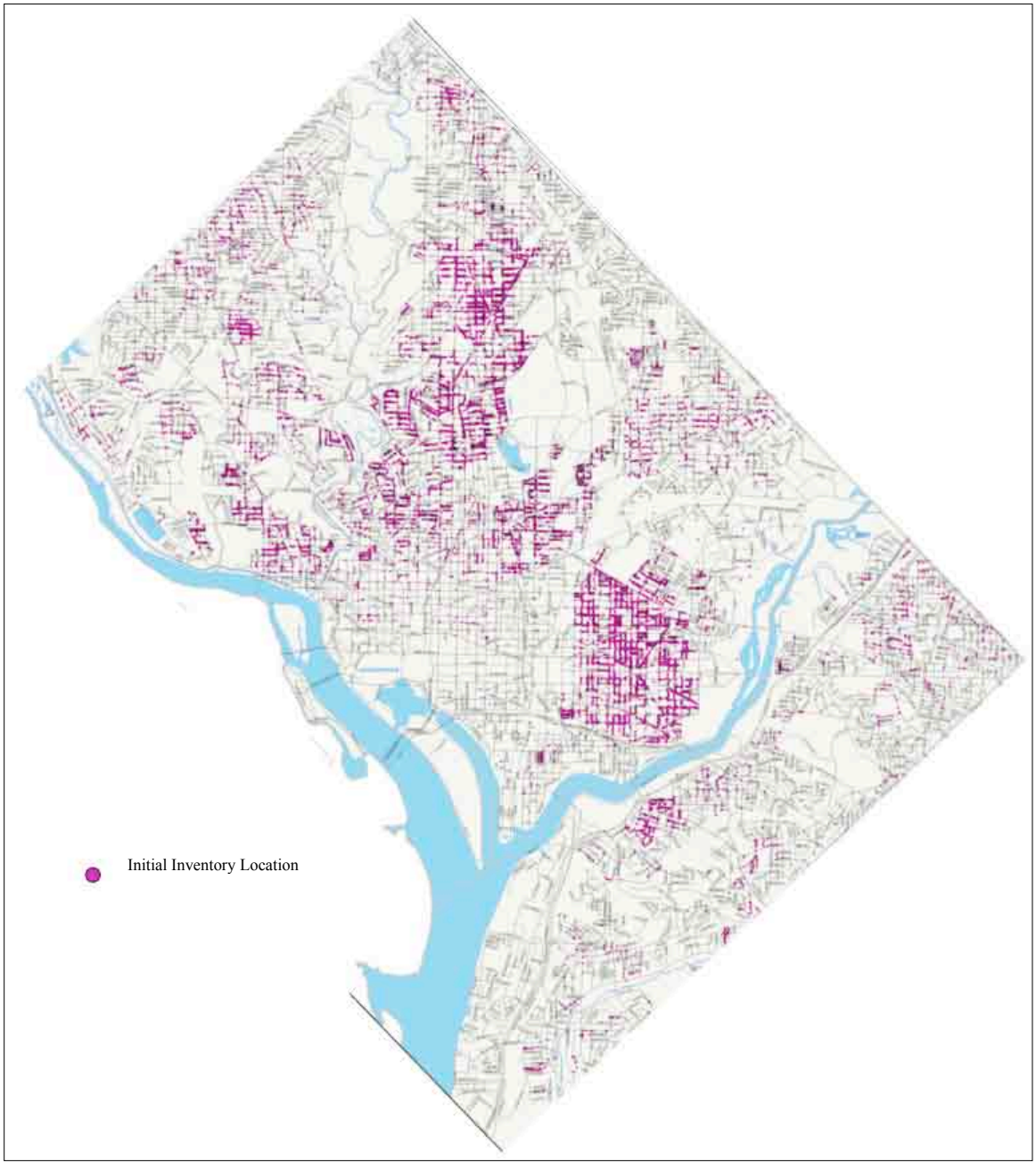
System-Wide Projects

System-wide projects are those major programs or projects that are undertaken throughout the water system to rehabilitate, replace or bring to compliance with current standards the aging infrastructure, such as small diameter water main rehabilitation, valve replacement, cross-connection elimination, and dead-end elimination programs. These system wide projects are summarized here and a description of proposed projects follows:

- **Lead Service Replacement Program.** In July 2004, the WASA Board of Directors adopted a program to replace all lead services in DC. The typical service replacement includes the replacement of the lead water service with new copper piping. As required by the Lead and Copper Rule, WASA offers to replace the portion of the lead service line on private property at cost to the homeowner. From 2003 to 2005, approximately 6,000

lead services were replaced in public space by WASA. WASA.com contains a comprehensive list of addresses for planned service line replacements for 2005-2006. If the infrastructure contains lead, the homeowner will be provided the opportunity to have WASA replace the portion on private property at the homeowner's cost.

Figure 5.3: Locations of Premises Served by Lead Service Lines



- **Small Diameter Water Main Replacement/Rehabilitation.** There is limited funding to rehabilitate/replace existing smaller-diameter (12-inch and smaller) unlined cast iron pipe in the water distribution system. The objective of the program is to replace pipe when the condition warrants replacement, or to clean and line the pipe provided the pipe is in serviceable condition. The program will serve to gradually replace pipe that has exceeded the useful service life, improve water pressures, and reduce the potential for creation of biofilms and bacteriological activity that can impair the quality of potable water. WASA evaluates data related to the small diameter water mains (e.g., age of water mains, main break history, water quality data, and fire protection availability, etc.) to help prioritize replacement /rehabilitation needs.
- **Valve Replacements.** This on-going system-wide program is to replace defective valves throughout the water distribution system. Operable valves are necessary to perform the annual flushing program and to isolate portions of the system to perform routine and emergency repairs and for new construction of capital projects.
- **Dead-End Elimination.** Water distribution system piping is ideally configured as a looped network, in which water can be provided from more than one direction. This ideal configuration has the advantage of promoting circulation of flow in the system and minimizing the extent of temporary service interruption during maintenance or repair operations. However, in the course of system development, some mains have been installed with a dead-end rather than a looped configuration, and these dead-ends exhibit the potential for the accumulation of stagnant water during low flow conditions and potential deterioration of water quality. The remaining dead-end locations will be corrected through pipeline loop extensions, where feasible, or through installation of specific flushing hydrants at the pipeline terminus where looping is not practical. These remaining pipelines will be corrected as part of the comprehensive rehabilitation program.

5.1.3 ADDITIONAL POTABLE WATER INFRASTRUCTURE REQUIREMENTS

The detailed WASA analysis that is the basis of the CIP is based on similar growth projections for water demand as for the Comprehensive Plan as well as a current assessment of problems and conditions. These lead to the conclusions that follow.

Overall

Generally, the overall pumping, storage and large transmission water mains appear to be adequate to support the projected land use change. The small diameter water mains and appurtenances serving individual street and blocks may need to be rehabilitated or replaced to support the changes. A detailed analysis of the infrastructure local to the development area will be required to comment further on the improvements needed. A brief description of the conditions in the seven water service areas follows:

First High

Portions of Central Washington, Near Northwest, Mid-City, Upper Northeast, Capitol Hill and a small portion of the Anacostia Waterfront comprise this service area. In Central Washington, the existing water infrastructure was installed from the 1930s through the 1970s and has 6-inch and 8-inch diameter water mains serving the individual city blocks. CIP work scheduled in this

element area includes large valve replacements, lead service line replacements, and small diameter water main replacements. The smaller size old water mains and appurtenances (8" or smaller) may need replacement/rehabilitation depending on connections to these mains associated with the projected development.

In Near Northwest, water mains 6-inch to 16-inch diameter serve the customers. These have been installed beginning in 1927 through the 1970's, with additional projects in the 1980's and 1990's. CIP work includes large valve replacements and lead service line replacement projects. The smaller size old water mains may need to be replaced.

In Mid-City, 6-inch to 12-inch diameter water mains serve the customers in the area that includes the North Capitol/ Florida/ Lower Rhode Island Avenue commercial areas. These water mains were installed beginning from 1885 through 1991. CIP work in the area includes lead service replacements, large valve replacements, and dead-end elimination projects. Due to the age of many of the water mains, they may need to be replaced depending on connections to these mains associated with the projected development.

Along the 14th Street corridor, 12-inch diameter water mains serve the customers. These were installed in the 1970's. CIP work includes lead service replacements, large valve replacements, and dead-end elimination projects. The transmission capacity to this area is adequate. Some of the older water mains have already been replaced. Additional smaller size mains may need to be replaced dependent on the layout of the projected development.

Second High

At the Armed Forces Retirement Home, the waterlines in this area are not owned operated or maintained by WASA, and this area has limited water service due to present land uses including a graveyard and golf course. The service to this area would require extension of water mains either from Second High or Third High Service Areas.

Along the 14th Street corridor, 12-inch diameter water mains serve the customers. These were installed in the 1970's. CIP work includes lead service replacements, large valve replacements, and dead-end elimination projects. The transmission capacity to this area is adequate. Some of the older water mains have already been replaced. Additional smaller size mains may need to be replaced dependent on the layout of the projected development.

Third and Fourth High

In Upper Northwest-West, 8-inch to 12-inch diameter water mains serve the customers. These were installed between 1907 through 1929 and additions were made in the 1970s. CIP work includes large valve replacements. The transmission capacity to this area is adequate. Some of the old smaller size water mains may need to be replaced depending on connections to these mains associated with the projected development.

Low Service Area

The projected development in the southeast/southwest falls within the Anacostia Waterfront where some of the smaller size mains were built in the 19th century. The southwest is mainly served by pipelines installed in the 1970's. There are no CIP projects in the southwest. The older, smaller size water mains (8-inch or smaller) may need replacement/rehabilitation depending on connections to these mains associated with the projected development. It should be noted that the Washington Navy Yard water system is separate from WASA's water system; however, WASA

does supply water to this site and could provide the overall projected water demands associated with projected changes.

St. Elizabeth's Hospital water system is also separate from WASA's water system. Historically it has been reported that low pressures have been observed in the eastern side buildings of the hospital. A CIP project is proposed to create a new pressure zone including a new 2-million gallons storage tank to correct the low-pressure problem for low-pressure areas in the vicinity.

In the Central Washington pressure zone, the existing water infrastructure was installed from the 1930s through the 1970s and has 6-inch and 8-inch diameter water mains serving the individual city blocks. CIP work scheduled in this element area includes large valve replacements, lead service line replacements, and small diameter water main replacements. The smaller size old water mains and appurtenances (8" or smaller) may need replacement/rehabilitation depending on connections to these mains associated with the projected development.

Anacostia First High

In East of the River-North, predominately 8-inch diameter water mains serve the customers. These were installed beginning in the 1900's, through the 1940's and 1960's. CIP work includes lead service replacements, large valve replacement, and dead-end elimination projects. The transmission capacity to this area is adequate. However, development at the higher elevations may be restricted by pressure limitations depending on the projected demands in this element area. Proposed buildings may require booster pump systems, depending on their height, and/or some of the older water mains may need to be replaced depending on connections to these mains associated with the projected development. A CIP project is proposed to create a new pressure zone including a new 2 million-gallon storage tank to correct the low-pressure problem for low-pressure areas in the vicinity.

Anacostia Second High

In East of the River-North, predominately 8-inch diameter water mains serve the customers. These were installed beginning in the 1900's, through the 1940's and 1960's. CIP work includes lead service replacements, large valve replacement, and dead-end elimination projects. The transmission capacity to this area is adequate. However, development at the higher elevations may be restricted by pressure limitations depending on the projected demands in this element area. Proposed buildings may require booster pump systems, depending on their height, and/or some of the older water mains may need to be replaced depending on connections to these mains associated with the projected development.

5.1.4 POTABLE WATER RECOMMENDATIONS AND STRATEGIES

Recommendation In1.1.1: Adequate Water Supply

Ensure adequate raw water supply to serve current and future District of Columbia needs by working with other regional jurisdictions, the U.S. Army Corps of Engineers and WASA to maintain a safe and adequate water supply.

Even though current projections are that water supply is adequate to 2025, there are uncertainties associated with the future. For example, climate change may have an impact on resources that would change the study results, especially given the sensitivity of Potomac reservoir storage to changes in historical stream flow data. A positive trend is the water conservation of recent years.

The ICPRB 2005 study noted that single-family household water use rates declined approximately 18 percent between 1990 and 2000 in the Washington area. The study also noted that supplier programs encouraging conservation were potentially an important factor for this trend.

The District will continue to emphasize conservation programs, availability of low energy and water use appliances, and plumbing codes that encourage water conservation.

In1.2: Modernizing Water Infrastructure

Planned improvements to the water system involve normal maintenance to replace aging water distribution mains and small diameter pipes, and upgrades to keep pace with population growth and new development. This can include the addition of new water storage facilities, increasing the capacity of certain water mains, and upgrading pump stations.

WASA's Capital Improvement Program has identified the need for several new storage facilities to support growth projections by providing additional water pressure to certain areas of the District and to provide emergency backup service. Two million gallons of elevated storage is needed in the southern half of the Anacostia 1st High Service Area. WASA has worked with the District and reached an agreement to site this two million-gallon water storage tank at St. Elizabeth's Hospital. Currently, necessary approvals and permits are being pursued. Another two million-gallon elevated storage tank is needed in the Fourth High Service Area in the Upper Northwest-West. The Washington Aqueduct CIP calls for improvements for storage at the Georgetown Reservoir and transmission systems (pumping stations and transmission lines) and additional facilities for dewatering at the Dalecarlia water treatment/reservoir site.

Recommendation In1.2.1: Modernizing and Rehabilitating Water Infrastructure

In conjunction with WASA, the District must consider the aging water infrastructure, and the impacts of new development and increased density on the system. These parties must work proactively to ensure that the water distribution system will be upgraded to meet current and future demands. Planned water distribution system improvement programs currently target the rehabilitation or replacement of undersized or defective mains in the system that have reached the end of their useful life or have experienced structural deterioration. Concurrent programs ensure that the lines are flushed in order to eliminate the potential for stagnant water to accumulate at the ends of water mains.

Recommendation In1.2.2: Ensuring Adequate Water Pressure

It is recommended that the District work with WASA to provide land to locate storage tanks to ensure adequate water pressure to all areas of the District, as well as land for other necessary operations.

Strategy In1.2-A: Water System Maps

Update water system maps to show pipelines, valves, and hydrants accurately, as well as the age, material, size, and lining of pipelines.

In1.3: Drinking Water Quality Improvements

Over the past few years, the main challenge facing our drinking water quality has been the presence of high levels of lead exceeding the federal action level (which is about 15 parts per billion). The presence of lead in tap water indicates that lead is being leached out or is dissolving from the service pipes connecting the water main in the street to the residence or from solder or fixtures in a home's internal plumbing. As a result orthophosphate is being used to inhibit corrosion of lead and reduce lead levels. In addition, WASA has an aggressive lead service replacement program and is removing lead pipes from the distribution system.

WASA plans to spend in excess of $400 million to replace all of the District's 29,000 known lead service lines with copper pipes. As of 2006, more than 6,500 publicly-owned lead lines had been replaced. In the last two consecutive six-month monitoring periods, lead concentrations have been within federal standards.

Excluding the high lead levels, drinking water has met quality standards set by the federal government for public health protection. These regulations are identified in the Safe Drinking Water Act and its amendments.

Recommendation In1.3.1: Drinking Water Quality

Ensure that the District's drinking water quality meets all federal standards.

Strategy In1.3-A: Lead Service Line Replacement Program

Continue the implementation of the Lead Service Line Replacement Program as identified in the WASA CIP.

Strategy In1.3-B: Small Diameter Water Main Rehabilitation Program

Continue the implementation of the Small Diameter Water Main Rehabilitation as identified in the WASA CIP. Work includes rehabilitating small diameter (12-inch diameter and smaller) water mains to improve water pressure, system reliability and flows in the system, as well as to maintain water quality.

Strategy In1.3-C: Dead-End Elimination Program

Continue the implementation of the Dead-End Elimination program to eliminate the potential for stagnant water accumulation at the ends of water mains and to assist in maintaining water quality in the distribution system. Eliminating dead-end water mains is accomplished by looping to other water mains or by providing a fire hydrant to flush the line.

Strategy In1.3-D: Water Treatment Plant Improvements

Implement the planned improvements for the McMillan and Dalecarlia WTPs as identified in the Washington Aqueduct CIP. Planned improvements at McMillan include elevator and crane replacements and building renovations. Planned improvements at Dalecarlia include building, roadway and security improvements and clear well cleaning and disinfection.

5.2 WASTEWATER/ COMBINED SEWERS/STORMWATER

5.2.1 WASTEWATER/COMBINED SEWER/STORMWATER CONSTRAINTS AND ISSUES

Summary

The condition and capacity of the wastewater, stormwater and combined sewer systems varies greatly depending on the location, age, and service area. The combined sewer system serves approximately one-third of the District, while the separated sanitary sewer and stormwater systems serve the remaining two-thirds. WASA indicates that there is generally adequate capacity in both the combined and separated systems to handle the wastewater and stormwater flows generated within the District given current conditions, although peak flows in the combined sewer system do result in overflows being released into the Potomac River, Anacostia River, and Rock Creek. The combined sewer system is undergoing a 20-year renovation program in order to capture peak stormwater runoff and thereby minimize the discharge of untreated wastewater into these waterways, which includes tunnels to control overflows and increased capacity at Blue Plains.

One general issue that is potentially of concern regarding stormwater runoff is the creation of additional impervious surface area within the District. The areas where land use change and infill/revitalization are anticipated are areas where there is either vacant land or an expected intensification of use and/or density. These types of land use changes can lead to increased impervious surface and subsequently increased stormwater runoff. This will be of particular concern in areas where land use changes are anticipated within the combined sewer system service area. As mentioned above, the combined sewer system does overflow untreated wastewater into the Districts main surface water bodies and any increased level of stormwater runoff could potentially exacerbate the problem.

Wastewater Treatment Requirements

The Inter-Municipal Agreement (IMA) of 1985 between the District, Fairfax County, Montgomery County, Prince George's County, and the Washington Suburban Sanitary Commission delineates a system and funding structure for portions of outlying suburbs to utilize the wastewater treatment services at Blue Plains. This agreement was developed in coordination with MWCOG.

Wastewater projections for the Blue Plains Plant are derived using a structured approach approved by WASA and the Blue Plains suburban users. The process involves several steps. First, the MWCOG population forecasts are used to derive employment and household growth for each sewer shed using GIS to aggregate transportation zone forecasts. Using the employment and housing forecasts, COG applies the Regional Wastewater Flow Forecast Model (RWFFM) for the Blue Plains Service Area. This is a flow projection model developed for the Blue Plains Regional Committee by Metcalf & Eddy in August 2001. The model computes projections for 5-year increments up to 2030. The baseline flow is calculated by regression analysis, then incremental flow is computed using unit flow factors, population incremental data (household and employment only), and allowance for infiltration/inflow. The results are reviewed and accepted by all users during the forums of the Blue Plains Technical Committee and the Blue Plains Regional Committee (these are standing committees created under the 1985 IMA). Both

of these committees have approved the most current flow projections derived from the Round 7.0 population forecasts.

These flow projections show that Blue Plains has sufficient capacity to last until the year 2027 provided the users implement flow management steps to which all have agreed. For example, WASA must reduce flows by approximately 20 mgd during this period. These flow projections include additional annual average flow[ix] that will be generated by the CSS Long Term Control Plan during this period. This incremental flow increase is estimated to be 3.5 mgd by 2010, a 5.17 mgd increase by 2022, and a total increase of 8.67 MGD upon completion.

Adjustments to IMA allocations among users as one entity increases its need must be negotiated with the other parties. Although the current projections are that the total flow to the plant will be accommodated until 2027, the wastewater flows from the District may exceed the District's current IMA allocation during this time period. Therefore, the allocation will need to be negotiated during the currently ongoing renegotiation of the IMA.

Separated Sanitary Sewer and Storm Sewer Service Areas

The growth in population and jobs, which could add an estimated 20 mgd of total water demand, could result in a commensurate increase in wastewater of 17-20 mgd. The projected growth in populations and households could add approximately two-thirds of this to the combined sewer area. The total increases are less than 12% of the current estimated quantities of wastewater from the District and the existing sewer system is believed to have adequate transmission capacity. However, the significant land use changes that are anticipated would require localized additions or pipeline increases to accommodate the projected flows. In the combined sewer area, increases should be factored into the planned upgrades under the Combined Sewer System Long Term Control Plan.

East of Rock Creek Park and the CSS Area

This portion of the separated sanitary sewer and storm sewer systems is currently being assessed by WASA. Although, it is expected that there is adequate capacity in the existing systems to support the anticipated land use changes, WASA's assessment, when completed, will provide a detailed description of the system's capacity and condition. There are several areas of significant size that are expected to experience land use change, which could impact the effectiveness of these systems. In particular, the northeast boundary interceptor is operating near capacity and is in poor condition. However, WASA has extensive plans to rehabilitate this line in the near future. The planned improvements would greatly enhance the system's ability to support the expected growth and land use changes in this area.

West of Rock Creek Park

The existing separated sewer systems have adequate transmission capacity for the anticipated land use changes in this area. It is important to note that there is only limited growth anticipated in this area, with only small areas anticipated to experience land use changes. However, localized additions or pipeline increases may be needed to accommodate the projected flows of future development depending on their size and density.

South of the Anacostia River

The separated sewer systems south of the Anacostia River have adequate capacity for the anticipated land use changes and are in good condition. Although Historic Anacostia is still

served by the combined sewer system, it will transition to separated systems as part of the implementation of the CSS LTCP. The existing interceptor service in this area is also adequate; however, some site-specific improvements would be expected at areas such as St. Elizabeth's Hospital, in order to accommodate additional flows from future development. A more detailed analysis of both the sanitary sewer and the storm sewer would need to be conducted in order to identify and mitigate adverse impacts associated with site-specific projects that result from projected land use changes.

It is recommended that the on-going efforts to reduce stormwater runoff to the Anacostia River in order to improve water quality be continued and enhanced if possible.

Combined Sewer Service Area

The combined sewer system serves approximately two-thirds of the District and will absorb the majority of growth given the anticipated land use changes throughout the District. The combined sewer service (CSS) area will support 80% of the growth in employment and 70% of the growth in households within the District over the next 20 years.

This growth will generate approximately 12 mgd of additional wastewater to be handled by the CSS. Although there is generally adequate capacity in the CSS, it will be difficult to understand fully the potential implications of the anticipated land use changes until more site-specific developments are known. The impacts to the combined sewer system would be different for example, between a series of two-story buildings and one ten-story building in a given area. There are areas within the combined sewer system where significant land use changes, such as those that are anticipated, would require localized additions or pipeline increases to accommodate the projected flows.

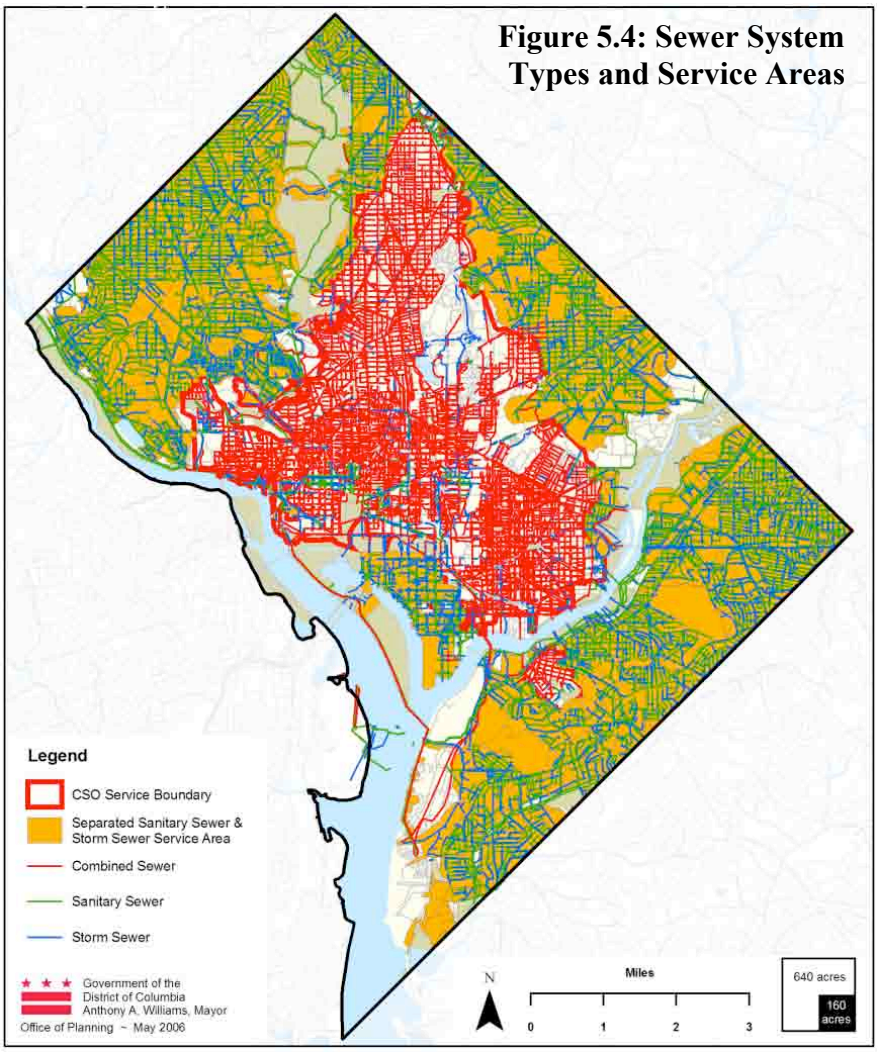


Figure 5.4: Sewer System Types and Service Areas

Portions of the combined system are scheduled for

separation, and more detailed engineering studies will be necessary to determine if separate sanitary and storm sewer service is practical as proposed. There are also several overflow tunnel projects planned as part of the CSS LTCP that will reduce the amount of amount overflows released into the area's waterways and prevent localized flooding.

5.2.2 PLANNED WASTEWATER IMPROVEMENTS

Planned Sewer Improvements

CIP Sanitary Sewer initiatives include pumping station upgrades, the continued evaluation of sewer conditions, the redesign of portions of the Potomac Interceptor as well as new permanent odor control structures at the Potomac Interceptor, controlling the infiltration/inflow issues where possible, and rehabilitating the East Side Interceptor.

Planned Wastewater Treatment Improvements

CIP wastewater treatment projects include, but are not limited to, a new filtration/disinfection facility, upgrades, facility upgrades, security improvements, and a new project for automated sampling.

The CIP focuses on improvements that can be made to liquid and solids processing separately. The CIP currently has $522 million for liquid processing related projects, which include, rehabilitating pumping equipment, installing finer screens at the plant, and upgrading the primary and secondary treatment facilities for improved efficiency and a reduction in operational costs. There is $515 million allocated for solids processing related projects, which include state-of-the-art digestion facilities, additional dewatering facilities, and improved thickening facilities.

The CIP also has $276 million for plant-wide programs at the Blue Plains Treatment Facility. The projects conducted at Blue Plains are focused on general maintenance and upgrades to the operation and functionality of the plant. Two major projects are providing additional chemical systems for metal salts and installing an automated computer system for monitoring the process at the plant.

There are several CIP projects that address sludge disposal. The Dewatered Sludge Loading Facility will be improved, to include an odor control system, upgraded solids processing equipment, and additional dewatering facilities. There will also be changes and improvements to the Solids Processing Building and Digestion Facilities, which will improve the quality of bio-solids and reduce their volume and weight. This should result in reduced truck traffic, noise, odor, and pollution.

Planned Stormwater Improvements

CIP stormwater improvements include projects for large diameter storm sewers and pumping station force sewer replacement and rehabilitation. These projects include the replacement of undersized, aged, or deteriorated sewers, and the installation of sewers to serve areas of new development or increased density.

5.2.3 Resultant Wastewater/Stormwater Infrastructure Requirements

A detailed list of additional infrastructure needs will be an expected output in 2007 of the on-going wastewater system assessment. There are areas of the city with known drainage/flooding problems that already are known to exist. Because stormwater management responsibilities are not clearly defined within the city, problems often get passed from one agency to another without resolution. There is a District Drainage Committee that provides multi-agency collaboration on problems, but this committee has limited influence and no resources when it comes to addressing problems. Current stormwater policy in the District is that post-development runoff conditions from a site should not exceed pre-development runoff conditions, but in areas where runoff is already causing flooding problems, additional controls should be required. Additional legislation/policy that requires developers to provide additional stormwater management onsite may be needed in order to correct existing runoff volume problems.

5.2.4 Wastewater/Stormwater Recommendations and Strategies

Recommendation In2.1.1: Improving Wastewater Collection

Provide for the safe and efficient collection of wastewater generated by the households and businesses of the District.

Recommendation In2.1.2: Investing In Our Wastewater Treatment Facilities

Provide sustained capital investment in the District's wastewater treatment system to reduce overflows of untreated sewage and improve the quality of effluent discharged to surface waters. Ensure that the Blue Plains Treatment Plant is maintained and upgraded as needed to meet capacity needs and to incorporate technological advances in wastewater treatment.

Strategy In2.1-A: Wastewater Treatment Capital Improvements

Continue to implement wastewater treatment improvements as identified in the WASA CIP. These projects include the replacement of undersized, aged, or deteriorated sewers; the installation of sewers to serve areas of new development or changed development patterns; and pumping station force main replacement and rehabilitation. Capital projects are required to rehabilitate, upgrade or provide new facilities at Blue Plains to ensure that it can reliably meet its NPDES permit requirements and produce a consistent, high-quality dewatered solids product for land application.

In2.2 Stormwater System

The District's storm sewer system consists of approximately 8,200 catch basins, 600 miles of storm sewers, and 15 stormwater pumping stations located throughout the system. WASA maintains over 400 separate storm sewer discharges into local rivers and creeks. Since the early 1900s, separate stormwater and sanitary sewers have been constructed within the District and no new combined sewers have been built.

Planned and programmed stormwater improvements include projects for large diameter storm sewers and pumping station force sewer replacement and rehabilitation. These projects include the replacement of undersized, aged, or deteriorated storm sewers, and the installation of storm sewers to serve areas of new development or changed development patterns.

Recommendation In2.2.1: Improving Stormwater Management

Ensure that stormwater is efficiently conveyed, backups are minimized or eliminated, and the quality of receiving waters is sustained.

Manage stormwater as an integrated process that enhances interagency communication and insures that there are clear lines of responsibility with regard to oversight, guidelines, and resources for the stormwater system.

Strategy In2.2-A: Stormwater Management Planning

As the administration of stormwater moves to the new Department of Environment, support initiatives for comprehensive multi-agency stormwater management and planning covering such topics as low impact development, education, impervious surface regulations, fees, and water quality education.

Strategy In2.2-B: Stormwater Capital Improvements

Continue the implementation of stormwater capital improvements as identified in the CIP.

Strategy In2.2-C: Stormwater Management Responsibilities

The District should develop an integrated process to manage stormwater that enhances interagency communication and formally breaks down responsibility and funding to manage stormwater drainage. This process should include an appropriate funding mechanism to consistently maintain Clean Water standards and reduce surface runoff. It should also insure that there are clear lines of responsibility with regard to which agency/agencies provide oversight, guidelines, and resources for the stormwater system and its management. This process should include establishing a consistent and reliable funding source to maintain Clean Water standards and reduce surface water runoff. The process should also ensure that stormwater improvements associated with new development are coordinated with the WASA CIP.

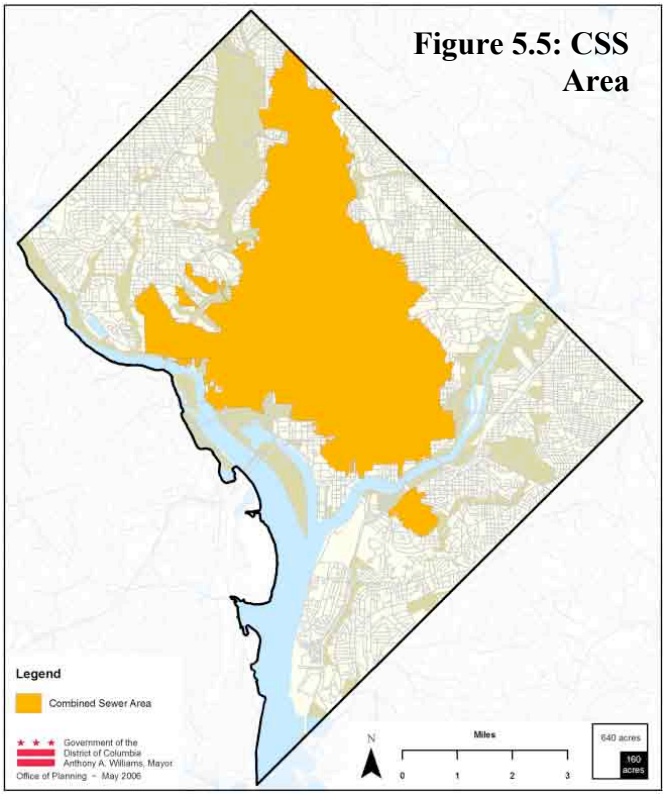


Figure 5.5: CSS Area

In2.3: Combined Sewer System (CSS)

As noted earlier, a portion of the District's sewer system includes combined wastewater and stormwater pipes. This area encompasses about 12,600 acres, or one-third of the District's land area. A majority of this area was developed before 1900.

In 2002, WASA developed a Long-Term Control Plan (LTCP) to minimize combined sewer overflows and thereby improve water quality. A key component

of the plan is the construction of four large tunnels that will allow runoff to be stored and then transported to Blue Plains for treatment and gradual release. Two of the tunnels will be located near the Anacostia River, one will be near the Potomac River, and one will be near Rock Creek. The LTCP also includes separation of combined sewers in several sections of the District, consolidation and elimination of 13 of the 60 outfalls, and implementation of Low Impact Development (LID) practices at WASA facilities and across the District.

When fully implemented, combined sewer overflows will be reduced by a projected 96 percent (98 percent reduction on the Anacostia River), resulting in improved water quality and less debris in our waterways. Overflow events would be reduced to two per year in the Anacostia River, four per year on the Potomac and Rock Creek, and one per year at Piney Branch.

Recommendation In2.3.1: Reducing CSS Overflows

Reduce the Combined Sewer System overflows to the region's rivers by implementing WASA's Long Term Control Plan (LTCP).

Strategy In2.3-A: Rehabilitate Pumps

Rehabilitate and maintain pump stations to support the LTCP.

Strategy In2.3-B: Federal Funding

Pursue federal funding to cover an equitable share of the LTCP.

Recommendation 1n2.3.2: Groundwater Protection

The District has some of the most stringent groundwater quality standards in the country. However, the standards defined in the 1993 District of Columbia Municipal Regulations are not strictly enforced. Since groundwater has not been used as a potable water source since the 1950s, the District does not regularly test groundwater. Yet the District should still prioritize groundwater protection for beneficial uses including surface water recharge, drinking water in other jurisdictions, and pre-emptive mitigation of future remediation costs for contaminated ground water, contamination of adjacent surface waters, or harm to or loss of sensitive flora or fauna. The DOH EHA Bureau of Environmental Quality, Water Quality Division should have adequate funding allocated to do so.

5.3 ENERGY INFRASTRUCTURE ASSESSMENT

5.3.1 POWER CONSTRAINTS AND ISSUES

Pepco performs regular assessments of each of its 1,400 overhead and underground feeder cables that carry power from 135 electric substations to neighborhoods it serves. Since 1995, Pepco's average customer has seen a 25 percent decline in the frequency of outages and a 40 percent decline in outage duration. Currently, Pepco reports that District customers experience 99.98 percent service reliability.

Pepco's goal is to continually improve safety and reliability and integrate the best practices of the utility industry. Each year, roughly 15 of the least reliable cables are selected for intensive engineering analysis and redesign. Subsequent diagnostic testing identifies potential overloads that could disrupt electric service. The results of testing are used to develop a corrective action

plan for each feeder to improve reliability, including everything from completely rebuilding a line, to installing larger transformers and additional fuses to keep pace with projected employment and household growth.

Despite design and maintenance efforts, there are still occasional power outages resulting from equipment failures, weather, and other incidents such as vehicles hitting poles or small animals chewing into overhead lines. Pepco addresses these issues by incorporating special shielded wire in heavily treed areas and animal guards to prevent short circuits caused by squirrels and other animals. Their capital improvements include more frequent tree trimming to prevent branches from damaging or blowing into lines.

Another alternative to improving service reliability is burying power lines. This alternative is costly and does not solve all power line interruptions. Underground lines are vulnerable to District agency and contractors' excavation for roadway and infrastructure projects. In addition, while sections of a feeder may be placed underground, the entire feeder may not be entirely buried. As a result, the remaining overhead sections are still vulnerable to weather and tree-related outages. While placing power lines underground may result in fewer outages caused by storms, when outages do occur they are typically of much longer duration. Locating the source of the outage is more difficult because it is not visible, requires the use of specialized equipment to test for and locate the problem, and digging up the cable adds time to the repair.

5.3.2 EMERGENCY PREPAREDNESS

Since 9/11 and in the wake of recent natural disasters, Pepco has spent a significant amount of time and effort on security issues, actively addressing and enhancing its emergency preparedness. Since late 2003, when Hurricane Isabel hit the region, Pepco has improved procedures for restoring service after disasters (Pepco, 2005):

Employee Assignments

Every employee will be assigned a second role during major service interruptions. This focuses the skill and experience of all employees on restoration and communication, particularly in the handling of customer phone calls.

Special Needs Customers

Pepco maintains a list of customers who depend upon electricity for life-support equipment. It communicates with these customers throughout the year, and in advance of approaching storms, helping them to get themselves prepared for emergencies.

Enhanced Planning and Drilling

An updated storm restoration plan provides for the most efficient use of personnel and equipment. Pepco also has intensified its internal drill schedule and has participated in joint exercises with state and local emergency management officials.

Outage Management System

Expanded capacity of Pepco's computerized Outage Management System helps to more efficiently analyze and locate the causes of outages.

Enhanced Preparedness and Outage Communication

A streamlined process has been established for determining estimated times of restoration after storms and for conveying the information to customers. Comprehensive communications emphasize personal preparedness.

While, these measures address Pepco's emergency response, the energy transmission network remains vulnerable to preemptive threats. Continued vigilance is required to ensure its security.

5.3.3 PLANNED POWER IMPROVEMENTS

5.3.3.1 Planned Substation Improvements

Pepco studies substation capacity needs for ten years out. Its latest ten-year forecast determined that two new substations would be needed to meet load growth needs for the next ten years. A new Northeast substation located near the intersection of New York Avenue and Florida Avenue, NE, to be completed in December 2006, will provide capacity with proposed expansions in later years for the NOMA/New York Avenue area, Hechinger Mall/ Bladensburg Road, H Street NE, and North Capitol/ Florida/ Lower Rhode Island Avenue commercial areas. A proposed Southeast substation near the Southeast Federal Center, to be completed in June 2015, will provide additional substation capacity for the South Capitol Corridor, James Creek, Buzzards Point, Waterside Mall, and Southwest Waterfront areas of the Anacostia West Bank.

Pepco is also increasing capacity at three existing substations by adding transformers and/or supplies. Existing substations will be expanded to serve the 7th Street, U Street Corridors, Howard University Town Center, and Historic Anacostia. As for beyond the ten-year horizon, Pepco will site and construct substations to relieve overloads of neighboring substations. Substations will be strategically sited in load growth centers to relieve the overloaded facility(ies) plus adjacent facilities that are approaching 100% of their substation capacity. Pepco cannot determine at this time the locations of new substations beyond the ten-year horizon with any degree of certainty.

Pepco plans to continue to run the Benning Road power plant indefinitely. A significant Pepco presence on the property is required for the existing substation, fleet, storage and service yard.

5.3.3.2 Planned Feeder Infrastructure Improvements

In regards to feeder capacity, all new services will require some degree of new feeder infrastructure. Because most new developments are required to have underground distribution systems, it can be expected that new conduits, cables, and subsurface or pad-mounted transformers will be required for any new development. Public Utility Easements are often needed to provide buried distribution systems inside multi-building developments. Dense commercial or multi-family residential developments will often require the extension of new mainline underground feeder groups, often in new duct banks. New duct bank construction requires digging in the streets or sidewalks. Less dense commercial and residential development not in the downtown area could require the extension of overhead or underground mainline feeders and possibly installation of new conduit. Feeders may need to be extended all the way from a substation up to one to two miles away.

5.3.4 ADDITIONAL POWER PLANNING REQUIREMENTS

As part of the planning process for the reuse/redevelopment of the land use change areas, it would be beneficial to identify potential sites for these types of infrastructure improvements before site-specific development plans are considered. Generally, the cost of new infrastructure is included in the utility rate base. For improved power infrastructure, site-specific developments should pay the costs associated with relocating existing power infrastructure and/or undergrounding lines. It is also important to note that as the Comprehensive Planning process is being conducted, some consideration should be given to the creation of public utility right's of way in order to decrease the cost of maintenance and minimize the interruptions to traffic and other services as part of the installation and maintenance processes.

Power Infrastructure Needs by Planning Area

The following table (Table 5.1) indicates the infrastructure needs per Planning Area from 2005 to 2015 based on the assessments for substations, feeder infrastructure, and power planning requirements. The table delineates necessary conduit/line upgrades and expansions, substation capacity and utilization level by percentage of firm capacity (to 2015) as well as general and neighborhood specific comments that note infrastructure deficiencies.

Table 5.1: Infrastructure Assessment by Planning Area

Area Element	Infrastructure Needs - Conduit/Line	Substation Capacity to 2015	Area Substation Utilization in 2015	Comments
Anacostia Waterfront-East Bank	New overhead & underground	Adequate - new capacity will eventually be needed.	In north, expected to use 90-100% of substation capacity by 2015; in south, will use < 90%.	Eastland Gardens / Kenilworth and Mayfair, Hillbrook & Manning Heights will be between 90-100% capacity. At Benning Rd. the Pepco Plant will continue to run indefinitely.
Anacostia-West Bank	Significant new overhead and underground	Expanding – Southeast substation to be added in 2015.	New substation will insure adequate substation capacity is available for southwest/southeast .	At RFK Stadium, the existing substation capacity will be adequate for next ten years, but new capacity will eventually be needed.
Central Washington	Significant new underground	Adequate - new capacity will eventually be needed.	Area power use varies between 70% -100% of substation capacity by 2015.	At NOMA and along NY Ave., the new Northeast substation (in service 12/06) will provide adequate capacity with proposed expansions in later years. Area adjacent to N. Capitol St. and vicinity of Foggy Bottom also has adequate capacity in 2015. Remainder will require study as needs grow.
Near Northwest	Significant new underground infrastructure in eastern portion of area.	Adequate - new capacity will eventually be needed.	Substation expansion where needed by 2015: assures adequate substation capacity.	At the 7th St. and 14th St. portions of this area, the existing substation is to be expanded, but significant underground infrastructure will be needed.
East Washington	New overhead & underground	Adequate - new capacity will eventually be	Northern half of area will be at 90%-100% of substation	At Deanwood and Burrville, the overhead lines are to be extended and new underground infrastructure is

Area Element	Infrastructure Needs - Conduit/Line	Substation Capacity to 2015	Area Substation Utilization in 2015	Comments
		needed.	capacity; southern half is at 80%-90% capacity in 2015.	needed. The Area north of Massachusetts will be between 90-100% of capacity; south of the area below Massachusetts will have greater capacity remaining.
Anacostia/ Greater Southeast	New underground	Expanding/ Adequate (see comments).	With substation expansion, area is not expected to exceed 90% of substation capacity in 2015.	At Historic Anacostia, the existing substation will be expanded and overhead lines extended, and there is some underground infrastructure needed. At St. Elizabeth's, significant new underground infrastructure is needed on west campus. Bellevue & Martin Luther King Jr. Ave. corridor will have adequate substation capacity in 2015.
Capitol Hill	New overhead & underground	Expanding/ Adequate (see comments).	The majority will not exceed 90% of substation capacity in 2015	Along H St NE, the new Northeast substation (in service 12/06) will provide capacity with proposed expansions in later years. At Potomac Gardens and in the Capitol Hill Business District, the existing substation capacity is adequate for ten years, but new capacity will eventually be needed. The area bounded by Pennsylvania Ave., Constitution Ave & 9th St. will also have adequate substation capacity.
Mid-City	Significant new overhead and underground infrastructure	Expanding - Northeast substation to be added and existing substation to be expanded.	Most of area will be at 90%-100% capacity.	At the 7th St., 14th St. and U St. Corridors and Howard U., the existing substation is to be expanded, but significant underground infrastructure needed. At Lower Georgia Ave. and the McMillan Sand Filtration Site, existing substation capacity is adequate for next ten years. New NE substation will serve North Capitol/ Florida/ Lower Rhode Island Ave. commercial areas.
Upper Northeast	New overhead & underground	Expanding/ Adequate (see comments).	The majority of area will have adequate capacity, although at 90% or greater in 2015.	At Hechinger's Mall, the new Northeast substation (in service 12/06) will provide capacity with proposed expansions in later years, but new underground infrastructure needed.
Upper NW-West	New underground	Adequate now, new eventually needed.	At or over 90% capacity	Existing substation capacity is adequate for next ten years. New capacity will eventually be needed. New underground infrastructure will be needed for Upper Wisconsin Corridor and both overhead and underground may be needed elsewhere.

Area Element	Infrastructure Needs - Conduit/Line	Substation Capacity to 2015	Area Substation Utilization in 2015	Comments
Upper NW-North	New overhead & underground	Adequate - new capacity will eventually be needed.	Most of area will be at 80%-90% capacity.	At Walter Reed, underground feeder capacity exists, but new infrastructure will be needed. New overhead and underground infrastructure will be needed elsewhere.

5.3.5 NATURAL GAS CONSTRAINTS AND ISSUES

Residential and Commercial

The assessment finds that natural gas is responding to market signals under the spur of Public Service Commission policies to promote competition. Natural gas infrastructure should be considered in relation to specific proposed development and allowed to compete with other alternatives (such as electricity, wireless telecommunications, and other options) for providing comparable services.

Vehicular

As part of WMATA's ongoing commitment to improving regional air quality, in 2002, they purchased 250 compressed natural gas (CNG) vehicles, bringing the total fleet of CNGs to 414. This is roughly 22% of the total fleet, which also includes diesel buses. The Metro system has two CNG refueling facilities (Bus Division in Northeast and Four Mile Run Bus Division in Arlington). Washington Gas has decided to concentrate its efforts on selling and transporting natural gas but not on owning, operating or maintaining CNG refueling facilities. As of September 30, 2005 Washington Gas closed all of its CNG refueling facilities.

5.3.6 ENERGY RECOMMENDATIONS

Recommendation In3.1.1: Adequate Electricity

Ensure adequate electric supply to serve current and future District of Columbia needs by working with Pepco and other service providers.

In3.2: Gas Infrastructure

The District will promote consumer education on the benefits and safety of regular monitoring of all aboveground and buried piping on the customer's side of the meter to prevent corrosion or leaking.

The District will promote competition among natural gas suppliers in a manner to achieve the lowest costs for consumers of this cleanest of fuels.

5.4 TELECOMMUNICATIONS

5.4.1 TELECOMMUNICATIONS CONSTRAINTS AND ISSUES

In the District, the federal sector, local government, commercial industry, and general public rely heavily on radiofrequency services, facilities, and devices. In recent years, this demand has necessitated the location of new antennae on both federal and private land. The District Zoning Commission has established development standards for antenna towers and the NCPC has

written guidelines for antenna locations on federal property in the National Capital Region. Both sets of guidelines govern the appropriate location of radiofrequency facilities and devices for functional and aesthetic reasons, protecting the operational needs of federal installations and parkland and preserving the important viewsheds. The only planning regulations that govern the location of new antennas and towers for human health or safety reasons are found in the NCPC Federal Elements Comprehensive Plan. These policies suggest joint use and collocation of antennae, interior attenuation devices, and prudent avoidance to high exposures of EMF.

The assessment finds that cable and telephone service is responding to market signals under the spur of Public Service Commission policies to promote competition. Wireless telecommunications infrastructure should be considered in relation to specific proposed development and allowed to compete with other alternatives for providing comparable services.

5.4.2 PLANNED TELECOMMUNICATIONS IMPROVEMENTS & INITIATIVES

OCTO and the Office of Property Management manage a program for leasing space on government property and buildings to telecommunications and wireless companies for antennae in the District. The Telecommunications Asset and Location Leverage (TALL) program currently manages contracts and has over 300 sites available for antenna installations by lease agreement. TALL has not yet been implemented, but is in the process of assessing potential new sites. Before space is leased for an antenna, the program evaluates the proposed communications system, space requirements, and frequency range as they relate to the proposed location.

The program recognizes that the need for new antenna sites in the District will increase concurrently with a growing employment sector and expanded and third generation wireless services. The program allows the District to generate revenues from the lease of District-owned building rooftops, towers, utility poles, and/or vacant land for use by commercial and other wireless operators. Revenue from this program will be directly reinvested in the District's telecommunications infrastructure. The goal is to build a standardized, consistent[x], available, and reliable wireless technology infrastructure. The hope is that this infrastructure serves as catalysts for innovation and operational improvement.

In order to elevate the stature of the District to that of other world class cities, the Mayoral 'City of Access' initiative provides free Internet access and free or low-cost computer sites for DC residents. The initiative also aims to expand Internet access and technology training in DC neighborhoods by combining public and private institution resources so that every resident may gain the skills to contribute to the economy.

5.4.3 TELECOMMUNICATIONS RECOMMENDATIONS AND STRATEGIES

In4.1: Planning and Coordination of Telecommunications Infrastructure

Localities such as the District of Columbia can plan for and regulate telecommunications infrastructure within the limitations of Section 253 of the 1996 Telecommunications Act. The Act prohibits local governments from imposing statutes, regulations, or other barriers that would have the effect of prohibiting a telecommunications provider from entering the market. It defines the authority of local government to plan and regulate such attributes as facility location,

height, setbacks, and safety standards. The Federal Communications Commission (FCC) has the overall responsibility for regulating the telecommunications industry and has the ability to pre-empt local actions that do not conform to the provisions or the intent of the Act.

Recommendation In4.1.1: Development of Communications Infrastructure

Plan and oversee development and upkeep of communications infrastructure including cable networks, fiber optic networks, and wireless communications facilities to help support economic development, security, and quality of life goals.

Recommendation In4.1.2: Coordination with Other Infrastructure

Coordinate telecommunications infrastructure improvements with other infrastructure development, especially with the creation of multi-modal public rights-of-way.

Recommendation In4.1.3: Digital Infrastructure Accessibility

Promote digital infrastructure that provides affordable broadband data communications anywhere, anytime to the residents of the District. Implement programs to help residents, businesses, schools, and community organizations make effective use of this technology.

Strategy In4.1-A: Guidelines for Sitting/Design of Facilities

Establish locational and design criteria for aboveground telecommunication facilities including towers, switching centers, and system maintenance facilities.

5.5 SOLID WASTE COLLECTION, RECYCLING

5.5.1 MUNICIPAL SOLID WASTE CONSTRAINTS AND ISSUES

Trash Transfer

With the completion of programmed improvements to the Fort Totten Trash Transfer Station, the DPW's ability to process current MSW loads is adequate for current needs and it is anticipated that any MSW generated by projected growth of the type that DPW desires to process (residential and commercial waste) can be absorbed by the capacity of the District's two facilities.

Privately collected waste in the city can be deposited at both the Fort Totten and Benning Road transfer facilities. Of the three existing private transfer stations, one is in the Southeast area being acquired for the new baseball stadium and one is operating without a permit. A third, the Waste Management facility, is operating with a permit. The District needs at least one private facility to process waste, such as C&D waste, that is not appropriate at its two stations in the quantities needed.

Solid Waste Industrial Space

Department of Public Work's Solid Waste Management Administration (SWMA) is currently being displaced from two major facilities (900 New Jersey Avenue SE and 11th Street and O SE). There are plans to relocate the street sweeping operation from 900 New Jersey Avenue SE, but extensive renovation needs to be completed to a 1920's era garage at 201 Bryant Street NW for that to be accomplished. There are no proposed relocation sites for the employees and equipment currently housed at the other location. These two facilities provide office space,

equipment storage and maintenance, and are the base of operations for several SWMA services, to include, but not limited to street sweeping/cleaning, snow operations, litter can collection, and the general 24-hour per day/7 day a week operation of SWMA.

5.5.2 SOLID WASTE STRATEGIES

Strategy In5.1-A: Upgrade Fort Totten Facility

Upgrade the Fort Totten transfer facility to provide a fully enclosed, modern solid waste transfer station to meet the District's solid waste needs. Consider expansion of this facility to provide adequate space to meet other solid waste needs, including vehicle storage, white goods, and other special waste disposal.

Strategy In5.1-B: Trash Transfer Regulations

Enact regulatory changes that enable the private sector to provide more efficient trash transfer stations, be in compliance with enforceable regulations, and potentially provide a much needed state-of-the-art construction and demolition waste processing site under private operation and ownership.

6.0 RECOMMENDATIONS FOR NEW INFRASTRUCTURE AND PROPOSED DEVELOPMENT

6.1.1 PERMITTING

Per the District of Columbia Municipal Regulations (DCMR), all land disturbing activities in the District are regulated under law. As such, no entity may engage in any development on any property within the District until a construction permit from the District has been obtained. Approval of a construction permit is based upon the submission, by the permit applicant, of appropriate materials and supporting plans and documents to show the scope and nature of the proposed project or land use development.

This city code enables multiple District agencies to create regulations to ensure that projects adhere to federal regulations. Currently, the Department of Consumer and Regulatory Affairs (DCRA), DDOT, and the DOH EHA have oversight on permit issuance in the District (See Table 6.1).

Table 6.1: Agencies with Permitting Authority in DC

District Agency	Administration	Function
Department of Consumer and Regulatory Affairs (DCRA)	Building & Land Regulation Administration, Permit Service Center	Reviews & regulates new construction, additions, repair of existing buildings, demolition, new signage, water and sewer excavation, and site construction (fence, retaining wall, etc.)
The District Department of Transportation (DDOT)	Public Space Permitting Office	Permits the use or occupancy of publicly owned property between the property lines on a street and includes, but is not limited to, the roadway, tree spaces, sidewalks and alleys

District Agency	Administration	Function
The District Department of Health (DOH), Environmental Health Administration (EHA)	Watershed Protection Division, Sediment and Stormwater Technical Services Branch	Reviews construction and grading plans for stormwater management, erosion and sediment control, and floodplain management. Coordinates the permit review process with the DCRA
The District Department of Public Works (DPW)	Environmental Services & Solid Waste Management	Implements MS4 permit
DC WASA	Stormwater Permit Compliance Administration	· Ensures Potable Water Quality · Implements MS4 permit · Collects fees towards the Stormwater Permit Compliance Enterprise Fund
Environmental Protection Agency	NPDES permits	EPA issues NPDES permits and general permits for construction sites, certain industrial sites, and Municipal Separate Storm Sewer Systems (MS4s)

The DCRA is the main agency responsible for licensing, inspection, compliance, and enforcement programs in the District. DCRA consists of three operating administrations: Building & Land Regulation Administration (BLRA), Business & Professional Licensing Administration (BPLA), and the Housing Regulation Administration (HRA). Within these administrations, the Permit Service Center processes approval for new construction, additions, repair of existing buildings, demolition, new signage, water and sewer excavation, and site construction (fence, retaining wall, etc.). DDOT's Public Space Permitting Office permits the use or occupancy of the public space. Public space is defined as all the publicly-owned property between the property lines on a street and includes, but is not limited to, the roadway, tree spaces, sidewalks and alleys. The third District agency, the DOH, EHA's Stormwater Management Division, regulates land development pertaining to stormwater management, erosion and sediment control, and floodplain management. The Division requires applicants to submit an erosion and sediment control plan, or a stormwater management plan, or both depending on the nature of the development activity. An erosion and sediment control plan is required for 50 square feet of land disturbance. A stormwater management plan is required for 5,000 square feet of land disturbance.

Development within the District is often slowed by the current permitting process. Given that essentially all of the land in the District has been developed in some way, most projects require permits for demolition as well as construction. It is not uncommon for a project to require permits from 10 or more agencies, with each of those agencies potentially issuing more than one permit. While the District DCRA has established the Development Ambassador Program, which guides developers through the permit process by providing assistance in developing schedules, there is no centralized method for tracking permit applications and projects within the District. Therefore, each time an applicant meets with one of the permitting agencies for a new project, the applicant must explain the project and comply with the agency's requests for any necessary materials, and then wait for review and comments before moving forward. Although some permits can be applied for concurrently, the process of dealing with each individual agency is said to be a major cause of project delays.

A computerized permit application and project tracking system is one potential method to address the decentralized nature of the permitting process in the District. A database or other computer-based system for tracking permit application and project status could make it easier for individual permitting departments/agencies to review and monitor the status of permits and projects. It could provide a single location for all permit and project related information to be reviewed and updated by all departments/agencies. It would enable them to see the status of the permit application with all other agencies and keep track of changes with the proposed project as well. This could streamline the permitting process by reducing the amount of time needed for the applicant to explain the project to different agencies and wait for their review.

For citywide infrastructure projects, the District should also consider a single, comprehensive permit covering the requirements of all pertinent agencies with an effective period of up to two years. Many construction activities related to infrastructure can be covered under blanket permits. This approach works well for a program such as lead services replacement for which a blanket permit covers the pipe replacements for all addresses where this work is done in a given year, rather than issuing an individual permit for every address in the program. In a given year, WASA replaces several thousand lead services in public space, and without blanket permits, many thousands of individual address permits would be needed to support this work. Fees should be reevaluated as well. Consideration should be given to a waiver of permit fees for work done by another public agency within the city.

6.1.2 COORDINATION OF PROPOSED PROJECTS

A major challenge to an efficient permitting process is adequate communication between agencies, with failures resulting in poorly coordinated project and funding schedules. The District should develop procedures that insure infrastructure upgrades are closely coordinated with development and redevelopment plans in order to minimize traffic rerouting, street closings, disruptive subsurface excavation, and utility shut-offs. The current coordination vehicle is the DDOT 2-year plan; however, this tool is only good if it is current. As agency projects change in terms of schedule, scope, etc., this information needs to be reflected in the two-year plan.

6.1.3 DEVELOPER FEES

As developers identify potential project sites and begin to develop site-specific plans, they often face limitations with the existing infrastructure (to include streets, water distribution lines, sanitary sewer lines, stormwater lines, electricity infrastructure, etc.) on or adjacent to the site. One way to reduce costs to utilities and their consumers would be for developers to pay some or all of the costs to Pepco or WASA associated with either extending utilities to the project site or upgrading the existing utilities to the specifications necessary for their proposed project.

The utility extensions or upgrades that one developer funds to support their project often make it easier for subsequent developments to occur. In order to balance the costs of these types of initial utility extensions or upgrades, the initial developer and the DCRA's Building and Land Regulation Administration (BLRA) could negotiate to create a reimbursement program so that the initial developer can recoup a portion of the costs from later developers. These types of agreements are often called Latecomer Agreements, Recovery Contracts, or Reimbursement Agreements.

The Latecomer's Agreement provides a means for the initial developer to be reimbursed by the District through payments by other developers who benefit from the initial developer's infrastructure improvements. In some instances, the District and/or WASA and PEPCO may request that the initial developer provide additional capacity in the utility improvements to encourage and/or support future projects in the same area. In these circumstances, the District and the developer would often share the initial costs; the developer paying the costs associated with providing adequate capacity for their project and the District paying the costs associated with the additional capacity. As development occurs later, the latecomers pay fees to the District and finally the District reimburses the initial developer.

These agreements are usually written to aid development in specific circumstances and the reimbursements are usually limited to a certain timeframe. The BLRA would need to define a legal regulatory framework before implementing this option.

The District should consider using these types of agreements to encourage development and/or ensure that adequate capacity will be provided in the utility systems as upgraded before future developments. Doing this has the potential to avoid the both the costs and disruptions associated with repeatedly modifying the various utility systems as development continues and intensifies, especially given the anticipated changes in the known change and revitalization/infill land use areas the District has identified.

6.1.4 BUILDING REQUIREMENTS FOR TRASH REMOVAL

The District's development is known for its balance of high quality design with historic preservation. Developers and architects often prioritize the aesthetics and public realm of a building and focus less on the logistics of building services and trash removal. Consequently, residential buildings often have inadequate space for refuse, recyclables, and other large items. Some types of larger projects, like sports facilities, may not efficiently process the enormous amounts of garbage and cardboard produced at every game, unless this is taken into account in the planning stages for the project. The District's building code or permitting process should ensure that new building design provide adequate space and clearances for trash pick up.

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8.0 ENDNOTES

[i] Projected requirements include potable water for drinking and human consumption as well as public works projects and fire suppression systems.

[ii] The Washington metropolitan area water consumptions removes approximately 1/6 of the Potomac's water under normal conditions. During periods of drought, that percentage raises to _ of the Potomac's water.

[iii] WASA utilized financial planning and rates with EPA's affordability analysis procedures to assess long-term rate impacts. Through analysis of a range of implementation schedules, the 20 year implementation schedule reflects the most modest rate impacts.

[iv] WASA does not have land use jurisdiction in the District and therefore cannot regulate implementation of LID in the city, but WASA will, incorporate LID techniques into new construction, modernizations, and on WASA facilities where appropriate.

[v] This figure translates to 167.1 million gallons of unleaded gasoline, 26.5 million gallons of diesel fuel, 2.4 million gallons of lubricant and approximately 120,000 gasoline gallon equivalent (GGE) of natural gas.

[vi] The Federal Property and Administrative Services Act of 1949 authorizes the GSA to prescribe policies and methods governing the acquisition and supply of utility services for federal agencies. In the District, the GSA enters into contracts with Washington Gas & Pepco to supply federal agencies in the District with electricity and natural gas.

[vii] MSW consists of everyday items such as product packaging, yard debris, food waste, furniture, clothing, newspapers, etc.

[viii] This facility is allowed to operate by court order; it does not have a permit

[ix] The LTCP will capture more waste and send more wastewater to Blue Plains because wastewater will be stored at designated overflow points to be released when flow to the plant is lower. The LTCP will control peaks so that sewer system is not exceeding capacity and consequently does not overflow.

[x] The District's current technology is not consistent across or even within all divisions. It has evolved in a largely unplanned fashion and contains a mixture of applications built on a variety of platforms. This has resulted in a lack of integration and redundancies.